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The Outlook

U.S. and Us

LAST week we referred to some directions in which Anglo-American collaboration can be of great mutual benefit to both countries. Since then Mr. Peter Masefield, the newly appointed Director-General of Long-Term Planning and Projects at the Ministry of Civil Aviation, has taken the argument further in an address to the Royal Empire Society. As recorded in this issue, he traced the Anglo-American interchange of ideas and material from the earliest days, pointing out how, in the first World War, British-designed aircraft were built in America and American engines (the Liberty) were used in British aircraft. How this was followed by the use of American-built Rolls-Royce engines in American aircraft in the second World War, and how there is a good likelihood of British jet units being installed in American airframes in the not-too-distant future.

This interchange is all to the good. It contributed vastly to the victory in the recent war, and its continuation can do much to assist not only our two countries but the world in general during the peace to come (the expression is used deliberately).

In spite of the old saying that the two nations are separated only by a common language—albeit spoken through a different organ—no unbiased person would deny that they can be of enormous mutual assistance. More than that, the future well-being of the world will depend to a very large extent on the two nations remaining close together, not least in the sphere which can do more than perhaps any other towards a close mutual understanding: air communications.

There is food for thought in the saying of a well-known American, quoted by Mr. Masefield: "If New York had been within 20 hours of London in 1773, as it is to-day, we should now be celebrating Empire Day here each year instead of Fourth of July." The implications of that thought are worth pondering.

The Editor and Staff of "Flight" extend to readers at Home and Overseas their Best Wishes for Christmas. We have especially in Mind those who are still serving away from Home, some in distant corners of the World. We extend Our Thanks for the many Kind Wishes already received, which we warmly reciprocate.

Enterprise

WHEN examining the Armstrong Whitworth A.W.52 experimental mailplane described in this issue it is somewhat difficult to allocate the credit for this very daring piece of work. The Ministry has shown confidence in ordering the machine, and the directors have displayed courage in undertaking the work. But neither would have been likely to do their share without complete trust in the chief designer, Mr. John Lloyd, and his staff. And so one is brought to the conclusion that upon him has fallen the greatest responsibility and that, therefore, to him is due the greatest proportion of the honour if the machine turns out to be a success.

That proviso is in no way a slur on Mr. Lloyd and his staff. The design of any tailless aircraft is a tricky business, and the design of one which incorporates so many unusual features as does the A.W.52 must have simply bristled with problems. That the work could be undertaken with a good deal of assurance was due to the very wise precaution of building first a glider on which most of the features could be tried out.

The flight trials, which are due

to start fairly early next year, will be watched with more than ordinary interest, for in the A.W.52 have been included most of the foreseeable features of aircraft types of the future. The most notable exception is, perhaps, the ultra-thin wing. That of the A.W.52 was a thickness ratio of 18 per cent, which is quite a high figure, but since ultra high speed was not necessary (the machine will be quite fast enough for mail-carrying) a thick wing was preferable from many points of view, chiefly on the score of weight. What *has* been done is to produce a very smooth wing surface to obtain laminar flow. It will be recollected that even on the glider, which was built of wood, the finish was of a high order.

Stability and control are two of the most difficult problems of a tailless, and they were successfully solved in the glider. Very unusual controls were designed, and there is no reason to doubt that they will be equally effective in the power-driven machine. The main change is brought about by the installation of the Rolls-Royce Nenes, but since their thrust lines are so close to centre of drag, there should not be a great change in trim between engine-on and engine-off conditions. More difficult may be the one-engine-cut case, but here again the power units are quite close to the fuselage so that the lever arm is not great.

A.M.T.S.

THE establishment of a new Department at the Air Ministry to deal with all technical aspects of the work of the R.A.F. is to be welcomed. The technical equipment of the Service has become so complex that this step was obviously desirable if the R.A.F. is to maintain its very high standards. Not only will the Department of the Air Member for Technical Services be in a better position to co-ordinate the different technical aspects, but to rationalize such spheres of the technical branches as training, postings and promotion.

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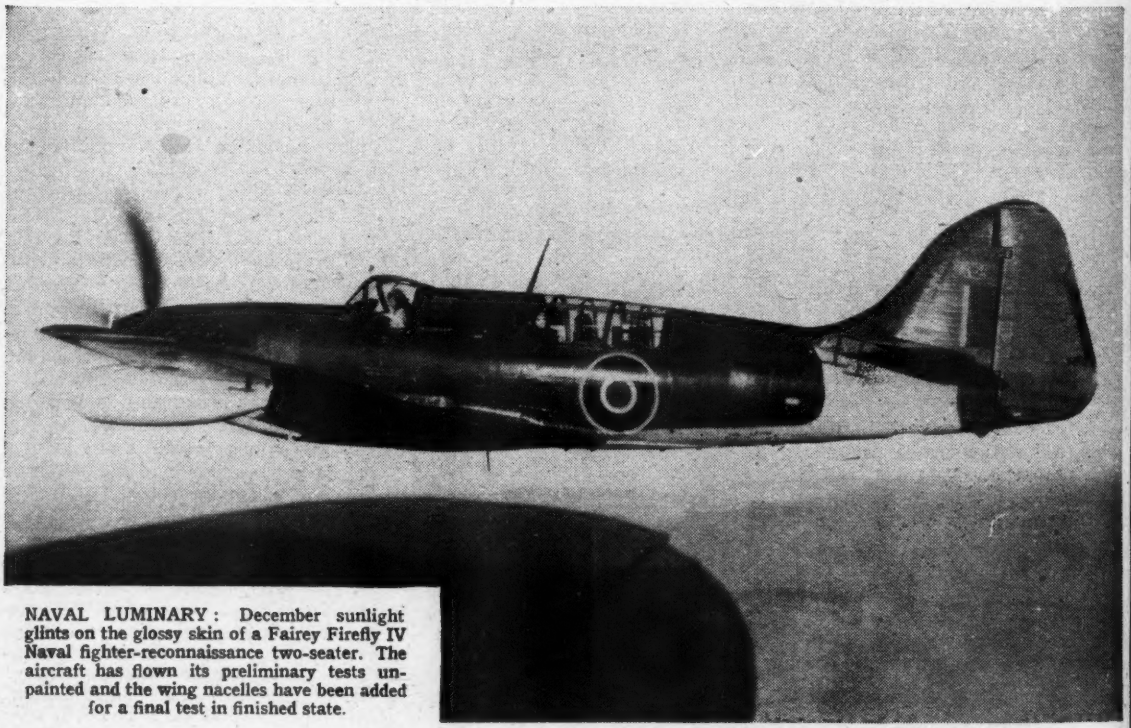
Choice of the first Air Member for Technical Services must have been relatively easy in this case. Few senior officers in the R.A.F. can have the qualifications possessed by Air Marshal Sir Roderic Hill. Not only has he held such important posts as Director of Technical Development, Director-General of Research and Development, and Air Member for Training, but he has been flying since 1916, first in the old Royal Flying Corps and then in the R.A.F., and he still flies all the latest types, including the jet fighters.

Nor has his flying been of the "easy" kind. It has included flying into balloon cables, and while he was in charge of the experimental flying at the Royal Aircraft Establishment, he investigated such phenomena as stalled flight and wing flutter. Even in the recent war, he took part, while he was Air Marshal Commanding the Air Defence of Great Britain, in operations against the flying bombs in order to study at first hand the best tactics to be employed.

As a staff officer and as a practical pilot he has been interested in all branches of technical developments, and those whose privilege it will be to serve under him will have the assurance that there is at the top a man who thoroughly knows his work.

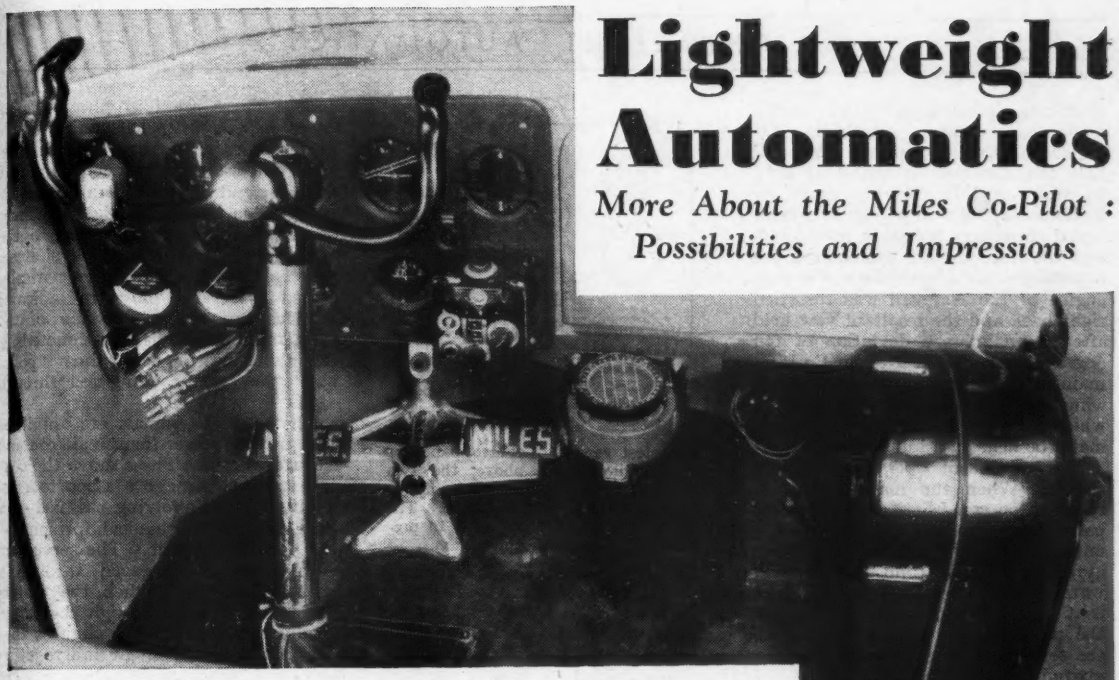


NAVAL LUMINARY: December sunlight glints on the glossy skin of a Fairey Firefly IV Naval fighter-reconnaissance two-seater. The aircraft has flown its preliminary tests unpainted and the wing nacelles have been added for a final test in finished state.

"Flight" photograph.

Lightweight Automatics

More About the Miles Co-Pilot : Possibilities and Impressions

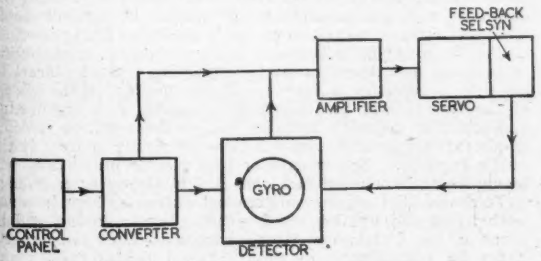


The Co-Pilot control unit and panel as experimentally installed in an Aerovan.

THE fact that automatic control is likely to be as useful in the operation of charter, executive and even private-owner aircraft as in that of larger transport types will be generally conceded. Indeed, charter aircraft, which are usually flown by a single human pilot, are probably more in need of such equipment; for, although the stages may be shorter, the single member of the crew may have a great deal on his hands and often wishes to be at least temporarily relieved of the mere reflex business of flying.

So far, the trouble with automatic pilots has been that the weight, complication and cost—quite apart from installation difficulties where space is necessarily at a premium—have been too great for the consideration of such non-vital equipment in small aircraft. It remains to be seen whether the new Miles automatic pilot will entirely satisfy the operator's needs in continuous bad-weather use, but it has, for some time, been installed in an Aerovan which has been used not only for test work but also for freight-carrying trips between the Reading and Northern Ireland factories.

Certainly its weight is low enough—a matter of 38 to 40 lb, including the rotary inverter; it is comparatively simple in operation and installation, and its cost will be of the order of £400 or so. Additionally, Miles Aircraft are proposing to issue the Co-Pilot on hire and maintenance terms, which will relieve the operator not only of the first cost, but also of maintenance responsibilities. Incidentally, this scheme will permit the company's research department to keep a record of any difficulties and to proceed quickly with any necessary modifications which operators may demand. Even in its prototype form the various items of the pilot are compact, and work is now almost completed on the production version. This—to use an ugly, but expressive, Americanism—has been successfully miniaturized, so that the main control unit is considerably smaller, and the complete servo installation for each control is each designed as a unit. Various aircraft manufacturers are already interested, and it is being fitted to a Marathon.



A schematic diagram which shows, in simple form, the relationship of the various components.

Three-axis

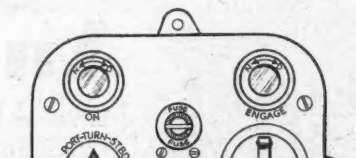
One point about the Co-Pilot should be made clear. It has been described as being of the "two-axis" type. While this is true as far as the controlling part of the system is concerned, the pilot itself provides corrections for movement in all three axes. In other words, while the pitch corrections are made to the elevator control, the yaw and roll corrections are both made through the ailerons. Such a system would obviously not provide directional-control accuracy of an order demanded for special military purposes, but there must be very few modern aircraft in which the system will not be adequate for all normal corrections. It also has the advantage of making directional recovery action—often comparatively violent when made on the rudder—comfortably gradual, since bank must first be applied and aileron yaw corrected by further bank before the aircraft returns to course. Although the correction is unexpectedly rapid, the slight delay makes for comfort.

As already mentioned, a prototype Co-Pilot is installed in a Miles Aerovan Previously a Co-Pilot had been installed in an Oxford and, knowing the different characteristics of the Aerovan, there was some doubt about its capacity to deal with directional corrections without excessive lag. It was felt that the amount of aileron needed to correct directional movements without the assistance of the rudder might be too great. The fact that the equipment works well in this machine provides a good indication

LIGHTWEIGHT AUTOMATICS

of its two-control capabilities. In the moderately bumpy conditions experienced, the mechanical pilot will hold the Aerovan on course at least as well as this can be done by a human pilot; any lag in directional correction is hardly noticeable, and the fore-and-aft corrections are dead-beat. As a final check, the port engine of the Aerovan was throttled right back and the resultant yaw held after a preliminary deviation of ten degrees or so. Thereafter the Co-Pilot maintained course with the starboard wing well down in the manner in which such engine failure would normally be held by a human pilot.

The routine of operation is quite simple. When the main control is switched on a red light on the control panel burns for rather less than a minute while the electrically driven gyro gathers speed and the amplifier warms up, after which a green light appears to indicate that the pilot is ready to be engaged. A press-button on the panel is then used to uncage the gyro and declutch the servos. Engagement may be made in any reasonable attitude, and the aircraft is brought quite slowly back to straight and level flight. Complete disengagement is effected through a push-button on the control column. This declutches the servos and cages the gyro, while leaving the power on so that re-engagement is immediately possible.



The latest version of control panel for the Co-Pilot, with, above, the two indicator lights and the pitch adjustment indicator in the centre. The "engage" button is recessed to prevent accidental application.

Incidental Controls

Although the Co-Pilot has adjustments both for turn and pitch, these on the prototype have been deliberately reduced in "power." On a dial in the centre of the panel is a pitch indicator on which the required angle of descent or climb can be set, but unless the booster button is used the change of attitude is slow. The turn control is normally used only for minor course-corrections and for anti-precession setting; turns are normally made after cutting out the automatic pilot, which would afterwards be re-engaged on the new course. In continuous flight it might be advisable to disengage the pilot momentarily from time to time in order to check the aircraft's trim; although the Co-Pilot is quite capable of holding an out-of-trim condition, this action would reduce the load and prevent any sudden change of attitude on disengagement.

The Co-Pilot might be described as being primarily electronic rather than all-electric, since the gyro displacements are measured by photo-electric means, and the resultant signals then amplified to provide the power for the servo units. There are four photo-electric "valves," or cells, on each of which light is directed, through lenses, by small bulbs, each pair of cells mounted at either end of two centrally pivoted arms. The amount of light reaching the cells is varied, according to the attitude of the aircraft, by shutters which are mounted on the centrally placed gyro. As the gyro indicates displacement in each or any of the axes, more or less light is directed on the photo-electric cells, thus "policing" the current being fed through each.

The resultant signals are amplified and provide power for the aileron and elevator servos. These move the control surfaces through a 1,000 to 1 reduction gear, involving the use of a little-applied mechanical principle—the vernier epicyclic. The servos are engaged and disengaged through a solenoid-operated mechanical clutch. When the motors are engaged and the power is passing through them, the servos cannot be manually overridden. The chances that all three return springs in the clutch might fail together seem to be very remote, but some final emergency servo disengagement system might be incorporated for its psychological effect. Earlier Co-Pilots were fitted with friction drives which could, in emergency, be overcome; but since the overriding still provided no effective continuous control, this scheme was abandoned.

There are limit switches in the servo units which cut out the system when the control surfaces are moved through more than a certain angle. These switches consequently prevent any possibility of over-stressing the structure by violent corrective movements. In each servo unit is a selsyn "generator," which feeds back an indication of the control movement to a repeater "motor" in the control unit. This motor readjusts the position of its respective pick-off arm, so that a recorrection signal is transmitted to the servo. To suit different aircraft, adjustments can be made in the control unit to suit its characteristics and to modify the relationship between the controls.

The Miles automatic pilot, some preliminary details of which were given in *Flight* of November 28th, is actually a development of the automatic control planned for a form of anti-ship "flying bomb" designed by the firm in the earlier war years. All the work has been done in the Miles research centre, which is now devoted almost exclusively to Co-Pilot development and where a team of young draughtsmen and technicians, under Mr. W. A. Chapman, has now produced drawings for the final production version.

AIR MEMBER FOR TECHNICAL SERVICES

AFTER a period of rumour and counter-rumour the Air Ministry has finally announced that Air Marshal Sir Roderic Hill, K.C.B., M.C., A.F.C., has been appointed to the new Air Council post of "Air Member for Technical Services," with effect from January 1st, 1947. This post will take charge of a new department of the Air Ministry, to be responsible for all aspects of technical work in the R.A.F. insofar as these are not the concern of the Air Staff.

In particular, the Department of the Air Member for Technical Services will be charged with building up the Technical Branch of the R.A.F., now regarded as a unified branch integrating the training, posting, promotion, etc., of armament, engineering and signals officers. The post of Air Member for Training, created during the war, is to be discontinued. Responsibility for flying training will now be assumed by the Air Staff, and for technical training by the Department of the Air Member for Technical Services.

Behind the important decision to form the new Department lies war experience which clearly showed that the complexity of modern technical equipment demands the whole-time employment of highly trained specialists. It is significant that the new arrangement will not only be the means of ensuring the continued technical pre-eminence of the R.A.F. but will enable the most economical use to be made of skilled man-power.

The Technical Branch should make a valuable contribution to research and development by providing trained officers to work in the Ministry of Supply. About one-third of the officers of the Branch will be University graduates with engineering and scientific degrees. Roughly half of these will be selected ex-aircraft apprentices who will take University courses at the public expense. The remainder (the greater proportion) will be chosen and commissioned from R.A.F. Group A tradesmen.

To ensure that officers on technical duties are kept in touch with flying and fighting requirements, flying training will be given in the University Air Squadrons to University candidates for commissions in the Technical Branch and many officers will have flying experience in the course of their technical duties.

Anglo-American Angles

Mr. Masefield Unravels Some of the Tangled Skeins Before the Royal Empire Society

THE subject of the lunch-time meeting of the Royal Empire Society in London, on December 11th, was "Some Aspects of Anglo-American Civil Aviation" and the speaker was Mr. Peter Masefield, Director-General of Long-term Planning and Projects at the Ministry of Civil Aviation. Major General Sir Frederick Sykes was in the chair.

Mr. Masefield recalled that Sir Frederick Sykes was the first Controller-General of British Civil Aviation in 1919 and thus had much to do with the first civil aviation negotiations in which the U.K. and the U.S.A. shared. But long before that, Anglo-American air matters made contacts. In 1906 and 1907 the Wright brothers tried to interest the British War Office and Admiralty, but without success. In the 1914-18 war British S.E.5s and D.H.4s were the only American-built aircraft to see front-line service, but American Liberty engines powered many planes in the R.A.F. In the recent war British-designed American-built Rolls-Royce engines powered many American aircraft. All this went to show how close had been the ties which had joined the two nations.

At the Paris Peace Conference of 1919 the first signs of difference in viewpoint showed themselves. The United Kingdom accepted the absolute national air sovereignty, the United States did not, and did not ratify the convention. The difference in viewpoints came to a head at Chicago in 1944 and was resolved at Bermuda in 1946.

By 1929, at a special session of I.C.A.N., Sir Sefton Brancker, who had then become Director of British Civil Aviation, wanted the British policy changed for one of freer development. The United States agreed, but the other nations would not have it.

Continuing his outline of the diplomatic—and sometimes not so diplomatic—aspect Mr. Masefield recalled that in 1934 Imperial Airways and Pan American Airways began discussions, and in 1937 an agreement was signed which was to link intimately British and American civil aviation. Scheduled services were about to begin when war broke out in 1939. Matters did not come to a head again until 1944, when a meeting was held in London, the British spokesman being Lord Beaverbrook and the American Adolph Berle. The meeting was inconclusive, but was the first occasion on which the thorny question of the "Five Freedoms" was discussed.

Inter-governmental Agreements

By this time there had been an abrupt *volte-face* in British policy, compared with Brancker's views of 1929. The British Government was in favour of an International Air Transport Authority "with teeth," the U.S. wanted wide-open competition. The British plan would have been unworkable. It was "operation by slide rule."

Although the Beaverbrook-Berle talks were inconclusive, three useful things did come out of them. The first was that all international agreements should be between governments and not between an airline and a government. The second was an understanding that cabotage was sacrosanct. The third was agreement about air bases built on British territory with American money for war purposes; they should not be made a major issue between the two nations.

In November, 1944, came the now historic Chicago Meeting, which was a complete failure on all political issues, but a magnificent success on the technical side, especially in the setting-up of P.I.C.A.O. But in spite of its inconclusiveness, Mr. Masefield thought the Chicago Meeting well worth while in that it ventilated points of view which, after prolonged thought, led to the settlement at Bermuda.

At the Bermuda Conference of January and February, 1946, the British representatives still stood on the Swinton White Paper, the American on the "Five Freedoms" document. The British side were fortunate in having Sir Henry Self, who understood both the American and the British points of view. In the shortest possible summary, the Bermuda Agreement, signed on February 11th, 1946, settled rights, rates and routes. Mr. Masefield described this agreement as the document which makes the greatest contribution to the future progress of Anglo-American civil aviation relations.

Mr. Masefield concluded this section of his address with the words: "I can say quite certainly that at no time in the history of aviation has the policy behind both British and American air transport been so closely in accord. Foundations have been well and truly laid so that the aircraft of both nations can fly between their territories throughout the world with the minimum of political concern."

Purchase of Aircraft

Turning to the technical aspect, Mr. Masefield outlined the circumstances which led to the purchase first of five Constellations and later of six Boeing Stratocruisers. "The decision to buy Constellations," he said, "has been much criticised, but I am convinced that it was wise and will be of fundamental value to British civil aviation from a long-term view." Of the Stratocruiser Mr. Masefield said this country was deficient in the production of aircraft in the 150,000 lb class, and that if it had to come into operation next year it would have had to be designed in 1942, "when we were somewhat occupied elsewhere." And as almost every other airline in the world flying on the Atlantic route had chosen the Stratocruiser, we took the plunge. It was a most promising type, carrying upwards of 60 passengers in comfort across the Atlantic, cruising at 340 m.p.h., and at lower cost per passenger than any contemporary type.

If we "guestimated" right in our specifications to-day, and if we built wisely into our new aircraft the operating experience we now possessed, and if our new gas turbines came forward and the industry built well, then from the 1950 period onwards our chances of going right to the front with new British civil types on world routes were very good indeed. During the war the British and American aircraft industries had worked closely together. Much of the present U.S. industry was founded with money from British orders during the early days. In air transport matters there were many things we could learn from the Americans. There was much knowledge, particularly on new types of engines, which we could impart to the United States. One might hope that the close technical accord developed in the war would continue in peace to the mutual benefit of both nations. He hoped British gas-turbine engines would appear before long in American airframes.

Mr. Masefield concluded with a brief survey of American operational conditions. With an area of three million square miles, and a population of 130 million, the U.S. was an ideal forcing ground for air transport. In some 700 aircraft a daily average of 30,000 passengers were carried. There was congestion at airports, but he thought that by next summer this would have been evened out. These things influenced our own long-range planning. The air traffic problems of America to-day would be ours to-morrow.

AMBIENT COMFORT

Developments in Cabin Atmosphere Treatment for Complete Conditioning

ON almost every occasion when the subject of cabin atmosphere conditioning has been discussed it has been stressed that humidification and/or drying treatment of the air supplied to the cabin is an absolutely essential concomitant to pressurization.

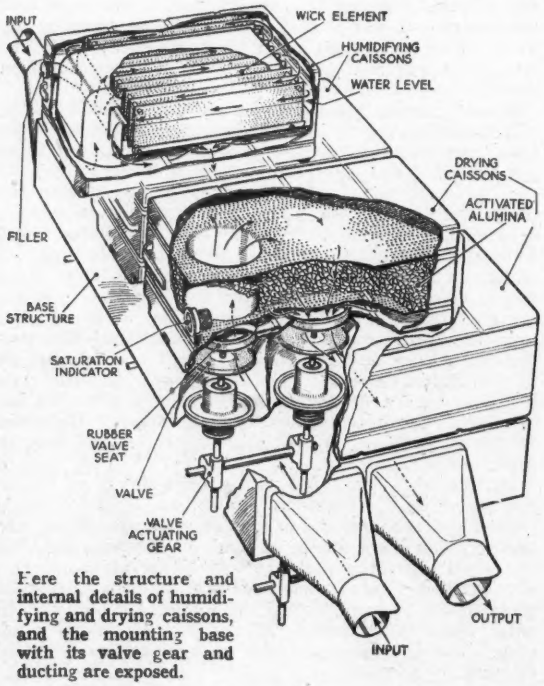
In brief, the problem can be summarized by the generalization that in sub-arctic conditions the air is cold and dry; in temperate climes a pleasant median condition obtains, whilst in the tropics the air is hot and wet. These "standard" conditions are, of course, subject to modification in actuality, but for the purposes of considering the cabin air conditioning problem they are a useful, indeed the only, basis on which to work.

It may be readily appreciated that flying through very dry air will cause discomfort, manifesting itself in dry throats and itchiness of the skin. Conversely, flying through very wet air will mean that everything inside the aircraft becomes damp—an equally uncomfortable state of affairs. Pressurization, as such, will not affect the issue; indirectly, it my actually aggravate the condition, for at great height the coldness of the atmosphere, even in temperate regions, and particularly in winter, is likely to occasion a relative humidity lower than the bottom limit of the acceptable comfort range. In such circumstances humidification treatment of the cabin air would be necessary. Drying treatment of the air is unlikely ever to be necessary in temperate zones.

However, aircraft fly from one climatic region to another, and consequently conditioning equipment capable of modifying extreme ambient conditions must be carried. Incidentally, it should not be thought that cabin air conditioning is necessary only in conjunction with pressurized cabins—it can be equally essential with aircraft designed to operate at moderate altitudes, if such operation is in, or through, extreme climatic regions.

Sir George Godfrey and Partners, Limited, manufacturers of the Marshall cabin blowers specified for the Tudor I and II, Hermes, Bristol 167, Ambassador, etc., have for some time been engaged on research into the subject of cabin conditioning, and in collaboration with Birlec, Limited, have designed a singularly attractive solution to the problem in the shape of neat standard units for easy incorporation into the normal cabin aspiratory system.

The conditioning unit is so placed in the air system that fresh inducted air is treated as required, and then distributed to the cabin.



Here the structure and internal details of humidifying and drying caissons, and the mounting base with its valve gear and ducting are exposed.

Essentially, the Marshall-Birlec scheme consists of the interposition in the system of "wetter" and/or "drier" units through which the inducted air is passed on delivery into the fuselage. In its passage through the conditioning units the requisite treatment is administered, and the air as supplied for passenger consumption is thus rendered with a comfortable relative humidity. That is to say, if the outside air is too dry (the most common case) then during passage through the conditioning units it is wetted; or if the opposite applies and the ambient atmosphere is laden with moisture, on admittance to the conditioner it is passed through the drier units and the requisite amount of superfluous moisture abstracted.

Conditioning Units

Humidifying and drying caisson units are robust sheet aluminium-alloy chromium-plated tanks, 10in wide by 24in long by 7½in high, arranged to fit on an appropriate base structure embodying input and output ducts and the requisite valve gear.

Each caisson has similar inlet and outlet apertures in its base, so positioned as to register with the valve ports in the mounting structure. The sectional drawing will make clear the arrangement. The ducts are plain straight-through passages, from the input one of which the air is abstracted, passed through the appropriate caissons for treatment, and delivered back into the circuit via the output duct. The capacity of the mounting base, i.e., the number of caissons it will accommodate, is determined by the size of the aircraft and the climatic conditions in which it is to operate.

Since the humidifying caissons are similar to the drying caissons, both in dimensions and in method of attachment, the numbers and type of unit carried can be varied according to the requirements. For example, the drawing shows a four-caisson installation made up of two humidifiers and two driers; but if tropical operation only is required four drier caissons might be used or, perhaps, three

AMBIENT COMFORT

driers and one "wetter." Conversely, North Atlantic winter operation would probably call for four humidifiers and no driers. Within the accommodation capacity of the mounting base, any combination of units can be made-up according to the particular requirements of the operational region of flight.

The caissons themselves are sealed on manufacture, and since they require virtually no attention (other than very simple servicing) their life can be considered almost infinite, particularly in view of their robustness.

Drying caissons are internally divided into three volume-layers by two perforated plate membranes, thus forming a "sandwich" the filling of which is 20 lb of activated alumina. This latter material is a highly absorbent chalk-like substance which is rendered particularly applicable for duty such as this by virtue of the fact that it does not break-down when saturated. Providing that when sated with water the drying caisson is itself dried out (by having warm air blown through it) the absorptive capacity of the alumina is regenerated without loss, and it is for this reason that the caissons can be considered to have virtually infinite life. This "drying-out" process is, in fact, the only servicing that the drying caissons require. A small silica-gel pack fitted behind an inspection window changes colour according to the amount of water absorbed and so acts as a saturation indicator.

As shown on the cut-away drawing, air is valved from the input duct into, for example, the drying caissons, whence it is directed by a short internal trunk into the air space above the top perforated plate. From here the only outlet is by way of filtration through the alumina, and in passing through this a major proportion of the water content of the air is abstracted. Having been subjected to this drying process, the air escapes through the lower perforated membrane and is then fed through the outlet port into the circulation system once more.

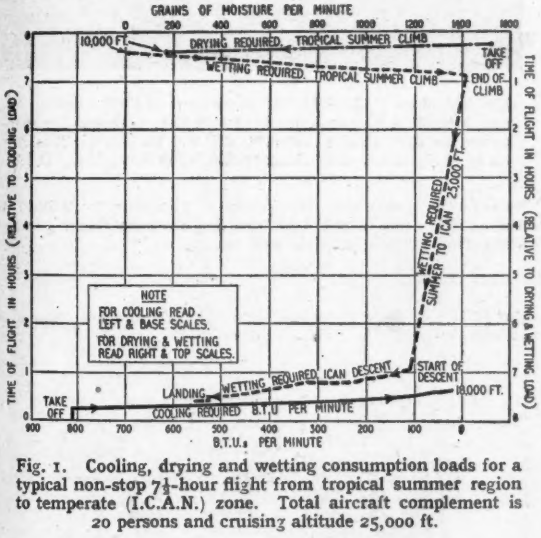

GRAINS OF MOISTURE PER MINUTE
0 200 400 600 800 1000 1200 1400 1600
10,000 FT.
DRYING REQUIRED TROPICAL SUMMER CLIMB
WETTING REQUIRED TROPICAL SUMMER CLIMB
TAKE OFF
END OF CLIMB
WETTING REQUIRED SUMMER TO ICAN 25,000 FT.
NOTE
FOR COOLING READ LEFT & BASE SCALES.
FOR DRYING & WETTING READ RIGHT & TOP SCALES.
START OF DESCENT
LANDING
WETTING REQUIRED ICAN DESCENT
10,000 FT.
TAKE OFF
COOLING REQUIRED B.T.U. PER MINUTE
900 800 700 600 500 400 300 200 100 0
B.T.U.s PER MINUTE
TIME OF FLIGHT IN HOURS (RELATIVE TO COOLING LOAD)
TIME OF FLIGHT IN HOURS (RELATIVE TO DRYING & WETTING LOAD)

Fig. 1. Cooling, drying and wetting consumption loads for a typical non-stop 7½-hour flight from tropical summer region to temperate (I.C.A.N.) zone. Total aircraft complement is 20 persons and cruising altitude 25,000 ft.

Converse treatment, that of "wetting," is afforded by the humidifier caissons. These contain a pleat-folded glass-wool wick element, supported on a tray beneath which is the outlet air space. From the inlet port a sealed trunk leads upward and along the central group of wick-folds, as shown in the drawing. The caisson is filled with water to the appropriate level (which is approximately half-way up the wick element), and the wick is kept fully saturated by capillary action. Inducted air is directed by the inlet trunk along the folds of the wick element. On emergence from the trunk the air can only reverse its direction and flow back along the wick-folds outside the trunk, where it escapes over the end wall of the containing tray and so enters the air space beneath. From here it is delivered through the outlet port into the circulating system.

In its passage through the caisson the inducted dry air traverses a considerable area of wick, and, in so doing, abstracts a quantity of water. By this means, on delivery back into the circulating system the air is given a comfortable relative humidity. The only servicing required for the humidifier caissons is that they must be filled with water when exhausted. Since the water capacity of the wetter caissons is but 15lb each, for a lengthy flight duration in dry conditions the wetting "life" of each caisson might perhaps be no more than 1½ hours. Obviously, "refuelling" measures must be provided, and to this end water storage tanks of appropriate capacity must be provided in the scheme. The control of water-feed from tanks to wetters is a matter for arrangement, i.e., whether manual under control of the flight engineer, or purely automatic.

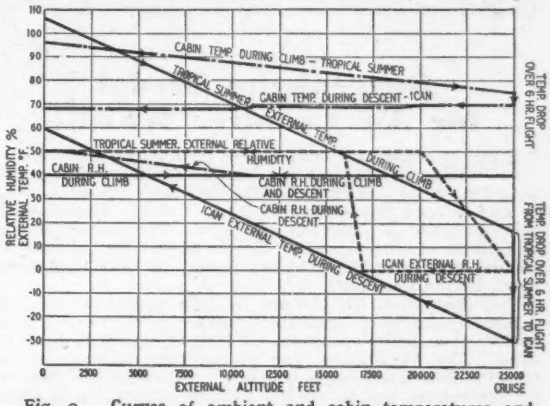

CABIN TEMP. DURING CLIMB — TROPICAL SUMMER
TROPICAL SUMMER CABIN TEMP. DURING DESCENT - ICAN
EXTERNAL TEMP.
TROPICAL SUMMER EXTERNAL RELATIVE HUMIDITY
CABIN R.H. DURING CLIMB
CABIN R.H. DURING CLIMB AND DESCENT
CABIN R.H. DURING DESCENT
ICAN EXTERNAL TEMP. DURING DESCENT
ICAN EXTERNAL R.H. DURING DESCENT
DURING CLIMB
TEMP. DROP OVER 6 HR. FLIGHT
TEMP. DROP OVER 6 HR. FLIGHT FROM TROPICAL SUMMER TO ICAN
RELATIVE HUMIDITY % EXTERNAL TEMP. °F.
110 100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30
0 2500 5000 7500 10000 12500 15000 17500 20000 22500 25000 CRUISE
EXTERNAL ALTITUDE FEET

Fig. 2. Curves of ambient and cabin temperatures and relative humidities for flight conditions as shown in Fig. 1

The caissons are anchored on the base structure in a very simple yet effective manner. Each caisson is fitted with two roller wheels at one end which fit into recesses in the mounting base. At the opposite end a simple tongue latch in the base, operated by a press button, engages an appropriate recess in the caisson and so holds the one secured to the other.

The inlet and outlet ports in the base of each caisson register with corresponding valve ports in the mounting base, the ports being furnished with soft rubber seats to effect a seal between caisson and base. These seats also function for the poppet valves by means of which the airflow to and from the appropriate caissons is regulated. Each pair of valves serving one caisson are simultaneously operated by a simple rack and pinion gear powered by a reversible electric motor actuated by a humidstat fitted in the aircraft's cabin. The humidstat is arranged to operate a relay switch at each limit of the comfort range, so that the appropriate valves are opened or closed according to the conditioning requirements.

Cooling the cabin air is also a necessity, although perhaps not quite to the degree that wetting and drying is. We have not shown cooler caissons in our illustrations since a finalized scheme has not as yet been definitely adopted. Cooling can be achieved by an indirect system on an inversion of the radiator principle, the coolant being solid CO_2; or alternatively, by the direct system of passing the air over slabs of water ice.

The cooler caissons will have standardized inlet and outlet ports, and similar methods of attachment in order to be interchangeable with other caissons on the mounting base. They will also be similar in length and breadth for the same reason, but in order to accommodate the bulk of coolant, the height will be greater. Effective lagging will be incorporated as an insulation against the dissipation of "cold" under conditions when cooling is not re-

AMBIENT COMFORT

quired all the time; for example, when flying from a temperate zone into a tropical zone, where cooling would not be required until, perhaps, the final two hours of flying.

The operation of the whole system is illustrated in the two graphs of a typical 7½-hour non-stop flight from a tropical-summer zone to a temperate zone. Fig. 1 shows that drying is required from take-off to 10,000ft, thence wetting is required for the remainder of the flight, whilst cooling is required from take-off to 18,000ft, and heating required not at all. The cruising altitude is 25,000ft. Fig. 2 gives the external temperatures and relative humidities throughout the flight, and, against these, the cabin temperatures and relative humidity. It will be noted that the latter remains constant at 40 per cent until the aircraft descends to 11,000ft, from which point the value increases gradually to 50 per cent at landing.

Rates of climb and descent are respectively 1,000ft/min between S.L. and 12,000ft, and 500ft/min between 12,000 and 25,000ft. The aircraft is assumed to have a complement of 20 persons, the air supply for which is 1 lb/person/min mass-flow from cabin blowers at all altitudes. On these data the conditioning as set out in the two sets of curves gives loadings as under:

Total drying load: 28,700 grains = 4.1lb water.
Total wetting load: 552,300 grains = 74.6lb water.
Total cooling load: 19,500 B.T.U. = 65lb solid CO_2.

This would entail a seven-caisson conditioning unit made up with three cooler, two drier and two humidifying caissons, with, in addition, a five-gallon water storage tank for "re-fuelling" the humidifier units. The total installed weight of this installation, at take-off, would approximate to 300lb.

Guggenheim Medal for Air Comdre. Whittle

"FOR promoting the development of turbo-jet propulsion of aircraft"; this was the citation for the award of the 1946 Daniel Guggenheim Gold Medal for Achievement in Aeronautics to Air Comdre. Frank Whittle, C.B.E. The presentation was made on December 4th by Mr. Theodore P. Wright at a dinner in celebration of "Honors Night" during the 67th Annual Meeting of the American Society of Mechanical Engineers, held in New York.

Two days later, Air Comdre. Whittle again addressed the A.S.M.E. who were in company with the American Rocket Society at a jointly sponsored luncheon at the Hotel Pennsylvania. The Air Comdre. pointed out the advantages of air travel in jet aircraft at 500-600 m.p.h. He made the interesting observation that as there is so little vibration it is sometimes necessary to attach vibrators to instrument panels so that instruments may be read. He went on to say that jet aircraft reach their destinations so quickly "they get places before the weather experts have time to change their minds." Operating costs were cut down because the reduction of journey time made possible a considerable saving in the provision of amenities "If the *Queen Mary* could cross the Atlantic in five hours." said Air Comdre. Whittle, "the swimming pool would hardly be necessary."

According to the calculations made by the de Havilland Aircraft Company, the cost per passenger mile of a 600 m.p.h. jet airliner would be two thirds that of a conventional machine at 240 m.p.h.

Air Comdre. Whittle, as announced in *Flight*, has already received the U.S. Legion of Merit. It is learnt that when he was introduced at the dinner during which the Guggenheim Award was presented, there was a spontaneous tribute to him as every one of the American engineers and their guests—numbering sixteen hundred—stood up.

Mr. Theodore P. Wright, Administrator of Civil Aeronautics and himself a Guggenheim Medal holder, presents the 1946 award to Air Comdre. Whittle, C.B.E. On the right is Air Chief Marshal Sir Guy Garrod, K.C.B., O.B.E., M.C., D.S.C.

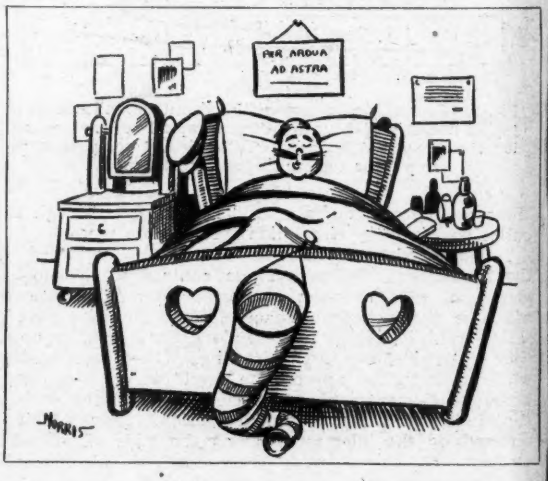
D.H. DESIGNER JOINS THE BOARD

AFTER 25 years on the design side of the de Havilland Aircraft Co., Ltd., Mr. R. E. Bishop was made a director of the firm on December 3rd.

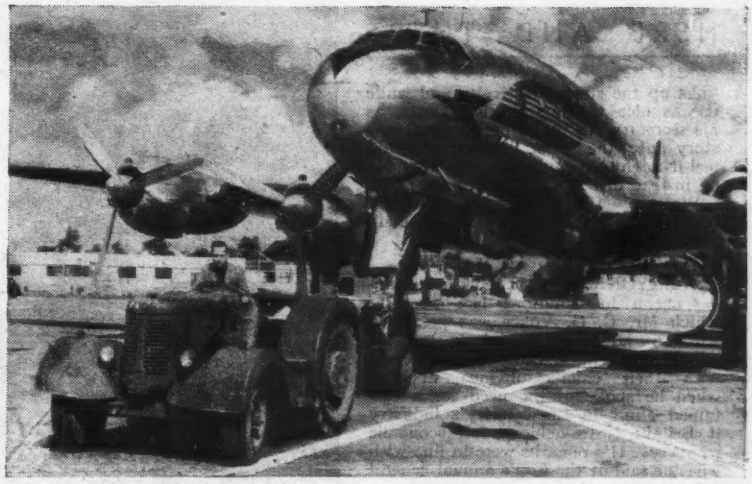
Mr. Bishop, who joined de Havillands in June, 1921, was the second premium apprentice under the scheme which later grew into the de Havilland Aeronautical Technical School, and may be said to have grown up with the company, from the early days at Stag Lane, where he had three years' experience in the factory before going into the drawing office.

He gained valuable experience under Mr. Arthur Hagg, working on the Moth and Dragon series and the Comet racers, and in 1936, when the Albatross was nearing completion, he took charge of the design office on the resignation of Mr. Hagg, who was later to become technical director of the associated Airspeed concern. The smaller all-metal Flamingo, which flew at the end of 1938, gave Mr. Bishop his first full opportunity.

But his greatest single triumph was probably the Mosquito—though only because the Hornet and Vampire did not have the same wartime chance to demonstrate their capabilities in prolonged and varied operational service. Since, there has been the D.H.108 research model to mark yet another, and even greater, step in Mr. Bishop's career.



HERE AND THERE



CIVIL ROLE: This type of David Brown airfield tractor, used by the R.A.F. during the war, has been selected by the Air Ministry for post-war duty, and B.O.A.C. already has 20 of them in action. Some Continental airlines also use them.

To School by Air

AMONG the many orders and enquiries which the Percival Meganser attracted at the Paris Show—and they came from no fewer than 11 different countries—was one from an African concern with an unusual request.

These operators ordered four Megansers and asked for the interiors to be adaptable for conversion with small seats to carry 12 to 14 school-children over distances of about 100 miles.

The aircraft will serve as the "school bus" in outlying colonial districts where homes are isolated from educational centres.

Returned with Thanks

AMERICA'S wartime air transport junction for the Middle and Far East—Payne Field, near Cairo—was handed over to the Egyptian Government last Sunday.

Announcing this intention several days before, Maj.-Gen. Robert M. Webster, Commanding General of the U.S. Air Transport Command, said that all U.S. Services personnel were being withdrawn but that about 30 American civilians would remain to complete the training of Egyptian personnel in the handling of technical equipment.

Under the terms of an agreement signed between the U.S. and Egypt last June, all the equipment, buildings and remaining supplies become the property of the Egyptian Government.

Tea-time with B.O.A.C.

THE above cross-heading does not refer to the mid-afternoon activities of girls employed at Airways House (in which they probably do not differ from those in every other business house), but to a section of the exhibition now running at the Empire Tea Bureau at 22, Regent Street, W.1, entitled "Tea Round the World—with B.O.A.C."

This show-piece, opened to the public on Tuesday last, depicts the tea-drinking customs of the various countries served by B:O.A.C. and its associated companies, and takes the form of a series of scenes modelled in relief.

There are also models of the various types of aircraft used, including a large model of the interior of the Tudor II and an example of the latest galley equipment for the York.

BRIGHT AND EARLY: A young exhibitor at the National Model Aircraft Exhibition at Dorland Hall, Lower Regent Street, W.1., arrives in good time with his original design of "tail-first" glider. HeisDouglas Ettridge, of Weybridge, and he spent 1,000 hr designing and building this model.

Radio-controlled Models

THERE is no doubt but that the finishing touch of realism is added to the operation of models—especially model aircraft—when they can be controlled by radio, and interest in this phase of model making is growing apace.

As an indication of this a meeting is to be held at 3 p.m. on December 21st, in the Y.M.C.A., Peter Street, Manchester, to which all those in the North of England who are interested in the subject are invited, whether their particular hobby is model aircraft, boats, cars, or what have you.

The chief idea is to develop a scheme for co-operation between various radio control enthusiasts.

Air Survey in Canada

THE enormous task of developing the untapped wealth of Canada is to-day being greatly helped by aerial photography, or "photogrammetry" to give it its new scientific title.

Canadian air survey organizations, and the R.C.A.F., who are sharing in this important work, are being equipped with a new Williamson camera specially produced for the job, namely, the O.S.C. Mk. 1, and the makers have announced a special three-weeks' course of instruction on the use and maintenance of the new instrument for the civilian and Service personnel concerned.

"Far Horizons"

WE have had the pleasure of seeing, from time to time, several documentary and semi-documentary films concerning the wartime activities of various of Britain's industries. The latest is the Dunlop film, "Far Horizons," produced by Verity Films in association with the Film Producers' Guild, and it is an extremely creditable piece of work.

This is not surprising, for it was directed by P. L. Cecil-Gurney, who has proved before that he knows how to weld a whole conglomeration of industrial activities into a coherent story told against the historic backcloth of the war. Fred Ford's factory photography, too, is masterly, for he never lets his lens loiter long enough on any particular process to risk boring those who don't know a calendar from an extruder.

Harold Warrender, as the executive,

HERE AND THERE

links up the story effectively, and while it was nice to have Patricia Cutts, as his secretary, to weave her personal war story into the general theme, we did feel it might have been properly rounded off instead of being allowed to peter out.

We are still wondering what *did* happen to Bill, her R.A.F. boy-friend!

Tribute to Mr. C. G. Vokes

EVERYONE who attended the luncheon in Guildford last week at which Mr. C. G. Vokes was presented with a large silver salver by the members of Vokes, Ltd., was impressed with their chief's obvious sincerity when he spoke of the need for a sustained effort in the country's industry if Britain is to achieve full economic recovery His remarks were in line with what he said at the firm's annual general meeting which preceded the luncheon, and which his own personal example fully entitled him to make; for Mr. Vokes is often in his office till midnight.

He related, too, how he began in business with £100 overdraft and for the first few years paid his staff more than he dared pay himself; in fact, he lived for some time on £1 a week.

On the subject of filtration, he said that aircraft engines in the desert had their lives extended from 10-12 hours to over 200 hours by the fitting of filters, and British equipment of various kinds outlasted the enemy's parallel equipment by about five to one.

To-day they were taking a keen interest in jet units and gas turbines on which filtration was vital.

The Solution

IF you want a house, get a job with Miles Aircraft, Ltd. That seems to be one possible solution to the housing problem, because this firm has announced a special scheme to build houses for its employees and hopes to have 70 ready by next autumn and another 400 as soon as possible.

The scheme, which was started by Mr. and Mrs. F. G. Miles and a group of their employees, is to create their own village for their own people, and a site has already been secured about a quarter of a mile from the factory. The houses are to be let and will be allocated on a points system, and no tenant will be turned out if he happens to leave the firm later on.

The local authority has joined with the management and employees in forming The Miles Housing Association, Ltd., which means they can get Government loans at reduced rates, and actual building will soon begin.

NAVAL VISITORS: Rear Admiral M. S. Slattery, (second from left), Vice-controller (Air) of the Royal Navy, recently visited the Chance Vought works with Cdr. C. F. Kemp (extreme right). Mr. Rex B. Beisel, the firm's general manager, holds a model Corsair, and other officers are Capts. J. L. Ewing (extreme left) and M. K. Fleming, Jr., U.S.N.

News in Brief

Aircraft carriers under construction for the Royal Navy are to be equipped with large capacity steam refrigerating plant for air-conditioning the lower decks. The largest of these plants will be capable of producing 9 tons of ice per hour.

* * *

Sir Frank Spencer Spriggs, managing director of Hawker Siddeley Aircraft Co., Ltd., has gone to the U.S. on the firm's business and will be away about two months, Mr. Hugh Burroughes is acting for him in his absence.

* * *

Mr. Reginald Dauncey Pearce is relinquishing the post of secretary to the Bristol Aeroplane Co., Ltd., which he has held since 1935, and will be succeeded from January 1st next by Mr. William Masterton, the firm's present treasurer.

* * *

Mr. Kenneth Hall has recently resigned the managing directorship of the Indian Aluminium Co., Ltd., to become managing director of the Northern Aluminium Co., Ltd., and has been joined on the board by Mr. S. E. Clotworthy.

* * *

Sqn. Ldr. J. Wallis, until recently on the permanent staff of the British Air Commission in Washington, D.C., has now been appointed North American representative for the Hymatic Engineering Co., Ltd., with an office in Washington.

* * *

Rolls-Royce will continue to occupy some of the blocks at the Hillington factory, Glasgow, and hope eventually to employ 3-4,000 workers. Other blocks are being occupied by Renfrew Foundries, and it is estimated that the section originally built for Rolls-Royce will find work for some 8,000 persons altogether.

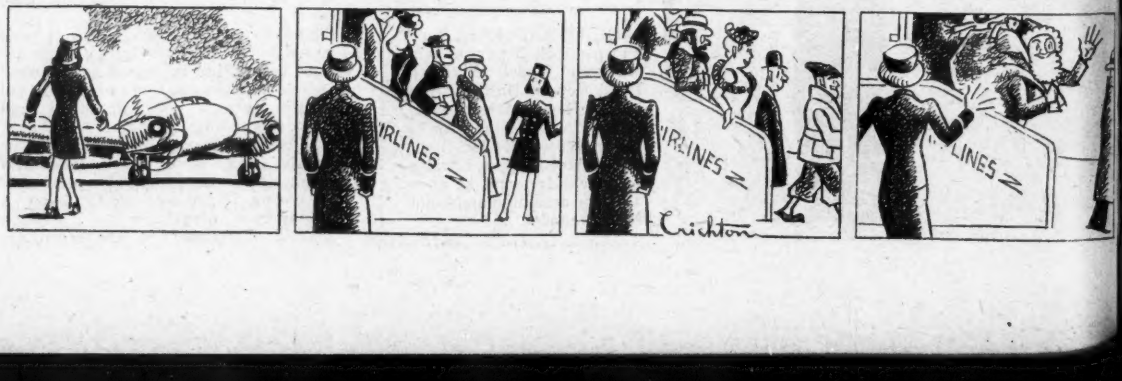
* * *

Short's erection bays at the eastern end of the airport factory at Rochester (approximately 80,000 sq. ft.) have been allocated by the Board of Trade to Portsmouth Aviation, Ltd., who will employ over 400 persons there, most of them sheet metal workers engaged on production of the twin-engined Aerocar.

* * *

Cellon aircraft finishes are now being manufactured under licence in Holland and Norway. In the former country Sikkens Lakfabriaken, of Sassenheim, are to manufacture Cellon products for marketing in Holland, the Dutch Colonies, Belgium and Luxembourg, together with their own "Aeroflex" dopes, while Alf. Bjerke, of Skippergarten, 29, Oslo, will produce for the Norwegian market.

AIRSTRIP . . . . No. 44



De-icing To-day

Points of the Thermal System : Induction System Problems

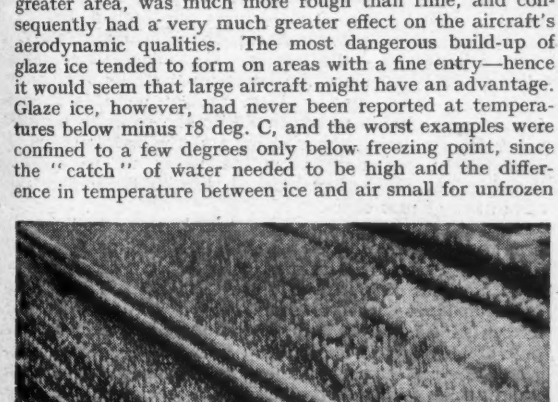
Résumé of an R.Ae.S. Paper by Mr. J. K. HARDY

IN the opening sentences of his published Paper, Mr. Hardy made two points especially clear. One was that, though the essential practicability of the thermal method of de-icing had been proved by tests, it was only from the experience of the designer and the operator that progress could now be made. The second was that any protective system, if it was to be successful, would need to be an integral part of the design. In the bulk of his Paper he made it obvious that, in his opinion, the only really practical method of protecting aircraft against ice was that of heat application.

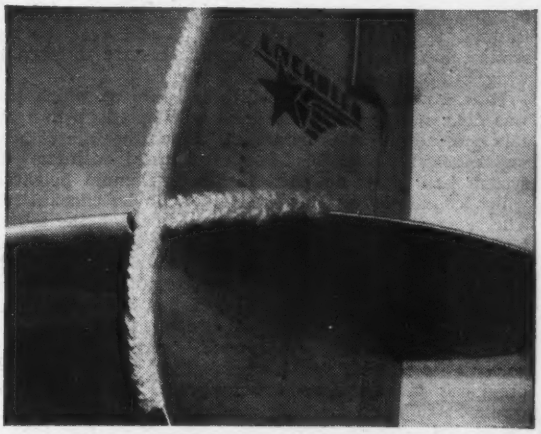
Icing conditions had been reported at all temperatures in the range between zero and minus 40 deg. C, though icing was more commonly encountered at the higher temperatures in the range since the maximum concentration of free water naturally decreased with temperature. It was a characteristic of icing conditions that water should be present in the atmosphere in a supercooled condition—in other words, in droplets which, though still liquid, were below freezing point. Unexpectedly enough, this supercooled condition was remarkably stable, and in the absence of stimulus water would freeze at considerably varying temperatures, and the effect seemed to depend on the constitution of a nucleus of crystallization present in the water. Consequently the meteorologist had been unable, so far, to discriminate between a cloud consisting of supercooled water and one consisting merely of ice crystals.

Types of Ice

The rate at which ice could form was limited by the rate at which the latent heat could be dissipated. This was at a maximum when the ice temperature became zero C and the type of ice which formed in this condition had a characteristic glazed appearance. With a smaller rate of "catch" of water and at lower temperatures, the much less dangerous rime ice was formed. Glaze ice covered a greater area, was much more rough than rime, and consequently had a very much greater effect on the aircraft's aerodynamic qualities. The most dangerous build-up of glaze ice tended to form on areas with a fine entry—hence it would seem that large aircraft might have an advantage. Glaze ice, however, had never been reported at temperatures below minus 18 deg. C, and the worst examples were confined to a few degrees only below freezing point, since the "catch" of water needed to be high and the difference in temperature between ice and air small for unfrozen water to be blown well back, thus increasing the affected area.



Nodules of glaze ice formed under the leading edge of a DC-3. Some are an inch long and apparently made by the water blown off the leading-edge "cap."



Ice formation on the fin and tailplane of a Lockheed 12-A. The finer the aerofoil entry the more dangerous is the growth. In this case the 12-A was almost uncontrollable

The formation of ice on aircraft was conditioned not by the temperature of the air, but by that of the surface. This might be higher than that of the air by reason of kinetic heating, but in conditions of icing the temperature of this surface was reduced considerably by the evaporation of the water on it. Speed alone, therefore, could not be relied upon to give any substantial measure of protection, and might even induce worse conditions, since the "catch" of water per mile flown was greater.

Prevention or Cure

There were three well-known methods of ice protection: mechanically, by means of an inflatable overshoe; chemically, by the exudation of fluid from the leading edge; and thermally, by heating certain sections of the structure. Mr. Hardy explained the defects both of the mechanical and fluid systems, and concentrated in his lecture almost entirely on the more modern thermal system. In this the surface of the leading edge was heated at a rate sufficient to prevent ice formation except at very low temperatures, when reliance had to be placed on the shedding of the ice from the heated surface.

The thermal system had been developed in the United States under the direction of the National Advisory Committee for Aeronautics, and was being adopted as standard, while it had also been used extensively in Germany. In the designs so far tested the surface was heated continuously, and though an alternative method, in which the surface was heated intermittently, might be practicable and more economical, this had not so far been tried. Since it would be impracticable to heat the whole of a wing, the problem was that of deciding how much of the leading edge, as a percentage of the chord, should be so heated. Experiments had so far suggested that this varied between 7½ and 18 per cent, depending on the total chord—the smallest relative heated area being required for the greatest chord. There was nothing rigid, however, about these ratios.

In present designs of thermal de-icing systems the air, after passing through a heat exchanger, has been carried by a duct along the leading edge and discharged into

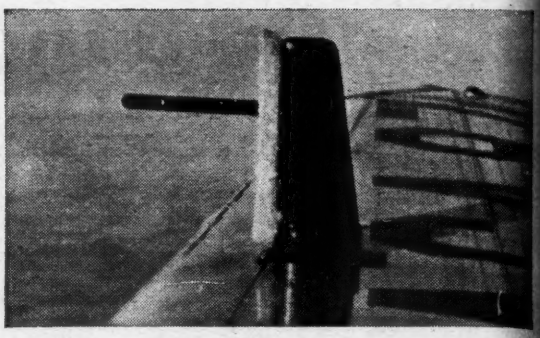
DE-ICING TO-DAY

passages formed between the outer skin and a corrugated inner skin which extended to the width of the heated area. The point of discharge from the duct was usually at the leading edge. Tests on models had shown the advantage of increased heating for the rear part, and a change of design was proposed in which the temperature over the leading edge would be plus 5 deg. C and over the rear section plus 10 deg. C. It was unnecessary to heat the wing aft of the leading edge.

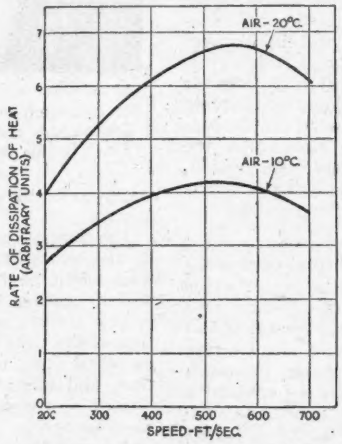
It was necessary to calculate the rate at which heat was dissipated and this increased with speed up to a certain pre-determinable maximum. Since the rate of heating naturally diminished with increased altitude, the system had to be designed for the maximum height at which conditions of icing were likely to be encountered. The severity of the conditions against which the system had to operate was a matter which must be left to the designer and the operator, but for full protection the optimum conditions would be an air temperature of minus 25 deg. C with a concentration of free water of half a gramme per cubic metre, in droplets 20 microns in diameter, at a height of 20,000ft—or 30,000ft for North Atlantic work. The previously given surface-heating figures would be sufficient for these conditions.

Heating Methods

The majority of the thermal de-icing tests had been made with the use of exhaust-heat exchangers, though combustion heaters were also being used. Since the heat exchangers formed a large part of the weight of the equipment, it might be better if the heating could be done with a mixture of exhaust gas and air, though there might be difficulties with the lead compounds and free bromine in the exhaust. It would naturally be necessary to arrange cross-over ducts between the engines in case of power failure. In any system it was essential for the heated airflow to be "resisted" so as to promote the transfer of heat, though resistance in the ducting itself should be kept down to a minimum. In experiments with a C-46 four heat exchangers were used, each with an output of 400,000 BTU/hour, two supplying heat to the centre-section, tail surfaces and cabin, and two to the outer-wing sections. Heat was supplied at the rate of about 10,000 BTU/hour to the surfaces and about 60 per cent of this was usefully dissipated. Naturally enough, the strength of the structure was likely to be affected by heating, and particularly by the local stresses caused by inequalities in temperature, but these stresses already, to some extent, applied to aircraft structures. In designs planned so far, the choice of temperature had been arbitrary. Although one of 154 deg. C had been customary and satisfactory, a higher temperature would be advantageous if it could be tolerated structurally.



The heated wing of a 12-A is clear of ice, which has formed as shown on the unheated test strut.



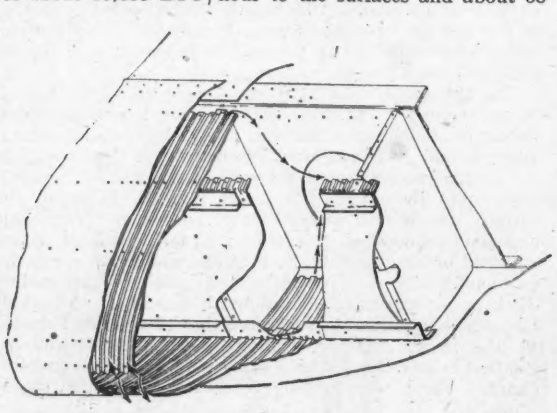
The effect of speed on the rate of dissipation of heat from a heated surface.

As far as control surfaces, tabs, and flaps were concerned, their protection against ice formation depended very largely on the designer.

As far as engine protection was concerned, Mr. Hardy considered that the history of induction-system protection had been one of makeshift devices, of which none was really satisfactory. The range of conditions which caused ice to form in the induction system was greater than in the case of any other part of the aircraft, and evaporative ice could form at temperatures as high as plus 25 deg. C. Of the two methods of protection—direct heating of the exposed surfaces, or the heating of the air—the former was obviously preferable since the latter involved serious power losses. With present methods it was found impracticable to screen the intake so as to prevent water from entering the system, and the usual ice-guard arrangement not only permitted water to be carried through, but also, when blocked, lost to the engine the advantage of ram effect.

As far as turbines were concerned, these had so far been considered only as fair-weather engines, and were, as such, useless to the commercial operator. The primary need was that of protecting the compressor. That of the centrifugal type was, to some extent, self-protecting by its centrifugal action, but the only final protection was that of heating the intake air. For this Mr. Hardy suggested the replacement of the present stone-guard—which could not be effectively heated—by a special grill, and by the use of momentum-separation to deal with stones and refuse. The axial flow compressor was not self-protecting and was particularly susceptible to ice effects. The difficulties of heating the compressor itself were formidable, though intake-air heating would also be difficult. It appeared practicable to do so by mixing it with gas taken either from the combustion chamber or from the exhaust.

Although fluid de-icing systems, using distribution grooves along the leading edges of the blades, had so far been comparatively satisfactory for the protection of airscrews, Mr. Hardy thought that here, again, a thermal system might be better. In this case he suggested the use of electrical heating.



A diagrammatic section of the thermal ducting in a leading edge of an experimental C-46.

Nimonic 80

Nimonic 80*, the new high-nickel, gas-turbine blading alloy that made jet-propelled aircraft a practicable proposition, is standardized for this purpose by all the leading engine makers because of its exceptional creep strength at red heat.

Industrial progress often waits upon the introduction of new materials and many possible uses for Nimonic 80 will suggest themselves, particularly where great stresses at high temperatures are involved.

*Nimonic 80 is obtainable as bar or blading and Nimonic 75 is sold in sheet form. Nimonic 80 and Nimonic 75 are Registered Trade Marks, and the alloys are the subjects of patent application.

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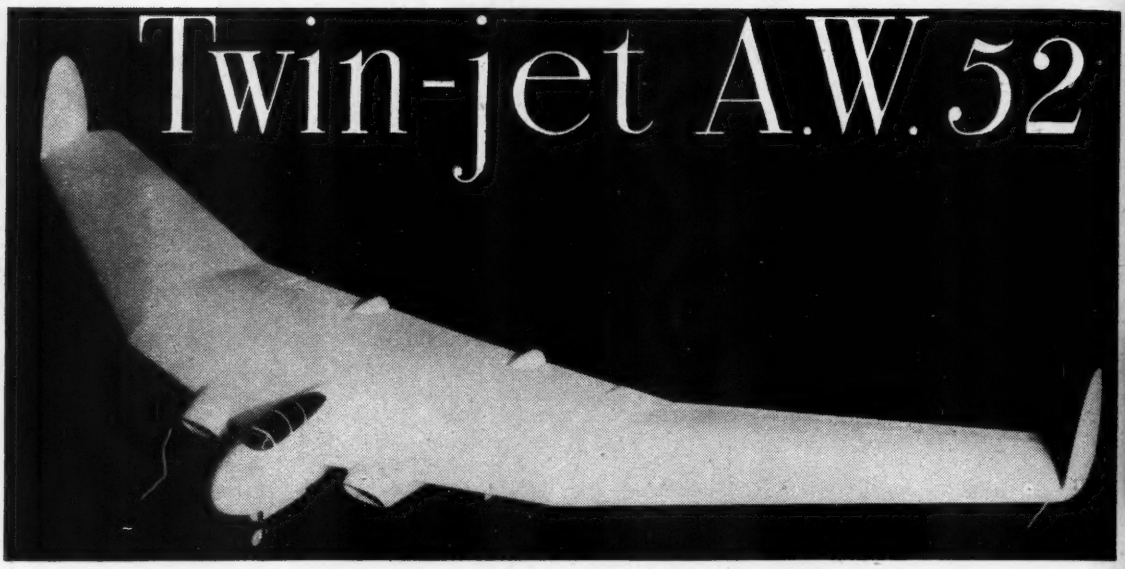
Twin-jet A.W.52



Tailless Experimental Mailplane with Two Rolls-Royce Nenes: Many Advanced Features

THE last weeks of 1946 will see the completion of the most advanced aircraft to be constructed in this country. Built to Specification E.9/44 and directly following the A.W.52 experimental glider (described in *Flight* of May 9th) this mailplane, apart from its very modern swept-back design and pure jet propulsion, embodies most of the latest features which have hitherto progressed little further than the drawing-board stage. It has, for example, boundary layer control by suction, thermal deicing, a pressurized crew compartment, and steerable nosewheel.

In layout and proportions the A.W.52 is very similar to the 52 glider from which a great deal of information on control and stability has been obtained. The fact that the experimental glider has remained virtually unchanged, and that the mailplane is practically a scaled-up version, is a credit to Mr. J. Lloyd and his design staff for the accuracy of their original conception. The unusual control system employing correctors, controllers and tabs, together with vertical wing-tip rudders, is also retained. Details of the principle of these controls and of their pressure-sealed balancing were included in our description of the A.W.52 glider, and further new diagrams appear on later pages.

Removal by suction of the boundary layer on the outer wing surface, just ahead of the controls, was another feature tried out on the glider. Two small fans on the undercarriage legs drove vacuum pumps for the purpose. On the mailplane this system is now largely under automatic control due to interconnection with the throttle controls of the Rolls-Royce Nene turbo-jets from which the suction is derived.

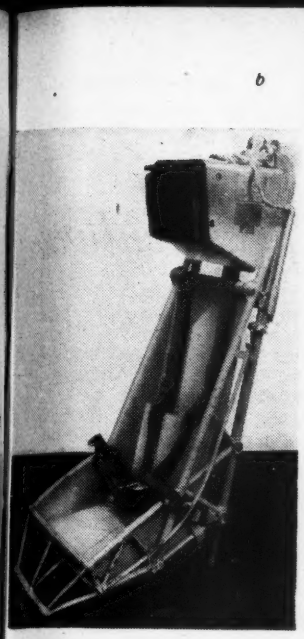
(Left) An inset wheel in the main control column will operate the steerable nosewheel through a servo motor. (Right) The adjustable rudder pedals also carry toe-operated brakes

Wing Factors

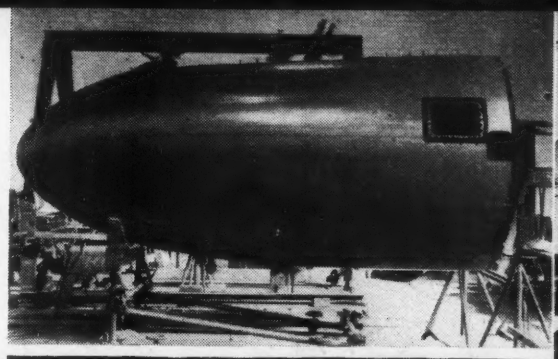
Removal of the boundary layer does not alter the stalling speed of the aircraft appreciably, but it does delay considerably the loss of control due to the stalling of the wing tips carrying the control surfaces. This tendency to early wing tip stall is, of course, a weakness of the swept-back wing and is one reason for investigations of forward-swept wing characteristics. Forward sweep provides some of the good high-speed features of swept-back wings without the defect of early wing-tip stalling.

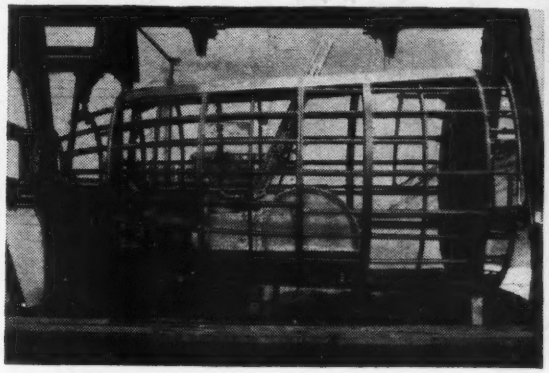
No attempt has been made with the 52 to provide a thin wing for high Mach numbers and the t/c ratio is 18 per cent. Fundamentally the wing construction is designed to provide a smooth surface giving laminar flow to 0.55 chord. N.P.L. aerofoil section 655-3-218 is used at the wing root, and at the knuckle and tip, N.P.L. 655-3-118 and 645-3-015 respectively. As on the glider, the sweep back on the leading edge is 35 deg., although projects under consideration will no doubt have greater sweep back and approximate more nearly to Delta shape.

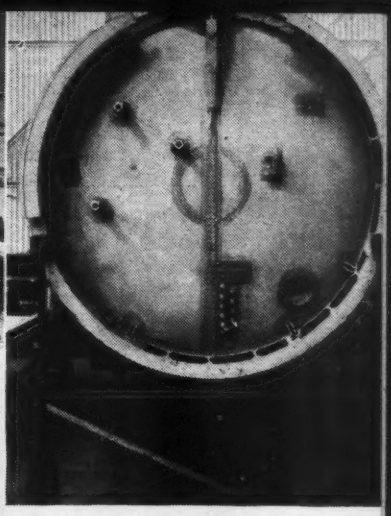
Provision of reasonable fore-and-aft stability, always a major problem with tailless designs, entails the fitting of devices to prevent early stalling. Slots are not to be recommended with a true laminar-flow wing, so for this reason boundary-layer suction was employed. Ultimately, for turbine-powered aircraft, one foresees the design with no engine air intake as such, but with compressors drawing all their air from the wing surfaces. The loss of power to be expected due to lack of ram effect would not, in fact, be important if the performance of the aircraft as a whole



An ejector seat produced by the Martin-Baker Company is provided for the pilot





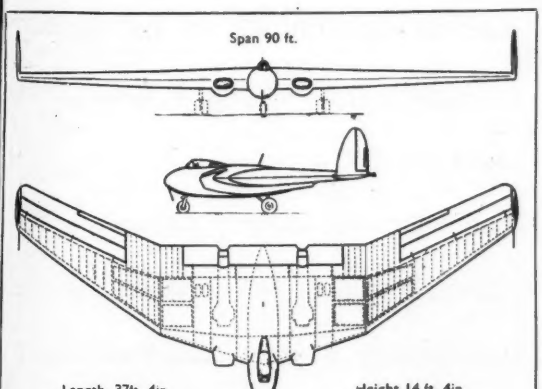


But for the small pressurised fuselage unit the A.W.52 is virtually all wing. On the left are two views of this two-seat compartment during construction, and above is the rear pressure bulkhead and connections for differential pressures of up to 5.5 lb.

were to be examined. A slight modification in engine design might eventually be called for to cope with the increased demand on the compressor system. The quantity of air dealt with in this way would not be very great; for example, on the A.W.52 the Nenes each take in about 1,300 cubic feet of air per second, while only 80-100 cu ft/sec need be drawn through the suction slots. For the 52 glider the figure was only 15-20 cu ft/sec.

In view of the large wing span involved (200ft) to give sufficient centre-section depth in the all-wing aircraft, and the associated problems of construction, it may be assumed that such designs are still fairly distant; but in a rather smaller span class, a similar swept-back wing with a body to provide the requisite capacity and carrying a fin and rudder may be expected much sooner.

A small difference between the 52s and later designs may be the provision of wing-tip anhedral. This may present stability problems at high speeds and through "digging-in" on the turn, but may be required to deal with undamped oscillations in the rolling plane at slower speeds. The best position for the fin and rudder surfaces, either on wing tips or an extension to the fuselage, is still rather undecided on near all-wing aircraft.



DIMENSIONS AND DATA FOR A.W.52

Power Units: Two Rolls-Royce Nene turbo-jets, 5,000 lb. thrust each at take-off.

Weights

Power Units	3,740 lb.
Total Weight	32,700 lb

Dimensions

Wing Area	1,314 sq. ft.
Wing loading	24.8 lb./sq. ft.
Chord at C.L. aircraft	21ft. 4in.
Chord at knuckle	15ft. 7in.
Fin and rudder area	37.53 sq. ft. per side
Freight Capacity	300 cu. ft. (4,000 lb.)
Sweepback nose to knuckle	17 deg. 34 min.
Sweepback knuckle to tip.	34 deg. 6 min
Flap Span...	28ft. 4in
Corrector and controller span	20ft. 2in.
Corrector area, per side	48.2 sq. ft.
Controller area (inc. tab.) per side	57.7 sq. ft.
Tab area, per side	6.85 sq. ft.

Cockpit and Controls

Although the A.W.52 is referred to as a tailless aircraft, it is a very near approach to the all-wing type. The pressurized crew compartment or fuselage which accommodates the pilot and his navigator-wireless operator has had to be placed forward across the wing leading edge to give a good view downwards and ahead. Lack of this was a slight weakness on the glider, but with increased sweepback on later designs the problem will not arise to the same extent. Power units and fuselage also cause bulges below the wing contour, but these are not pronounced.

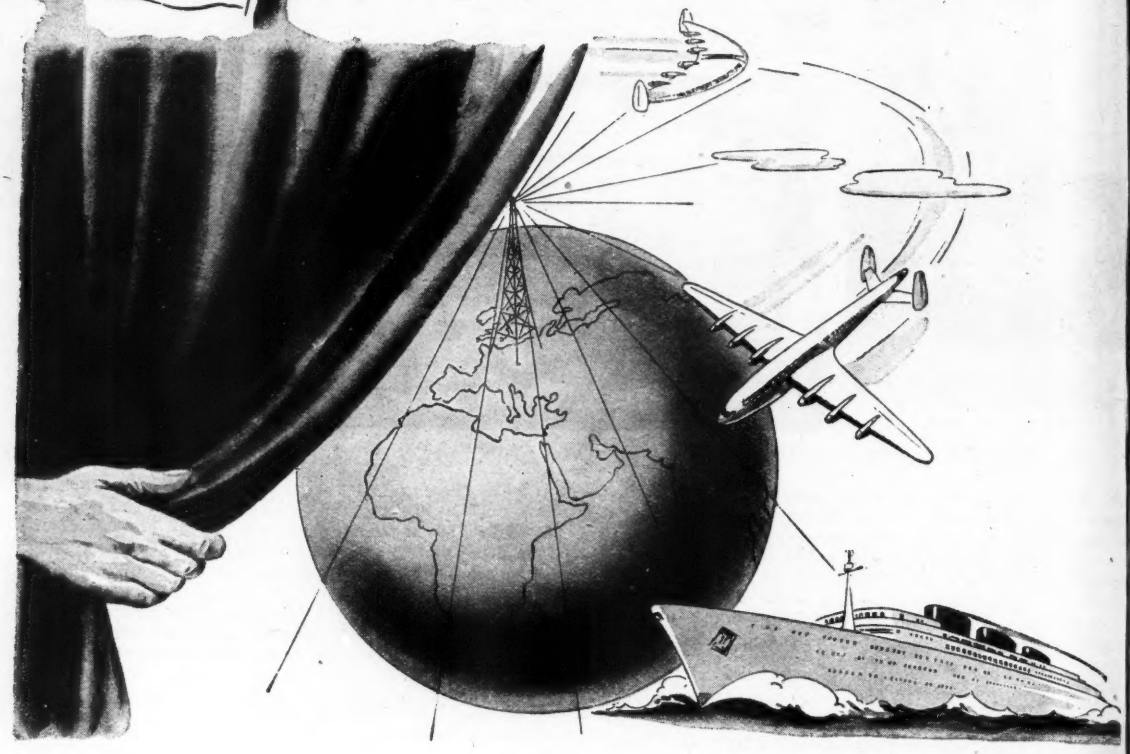
New-style pilot's controls as illustrated are fitted, and these include a small car-type steering wheel inset on the aileron "spectacles" and operating via a hydraulic servo motor. Pedal-operated brakes as favoured by many American manufacturers are also employed, and the pilot has a Martin Baker ejector seat. Behind the pressure bulkhead of the small fuselage unit is a spacious freight compartment with underside door. Outboard of this compartment are the two turbo-jet units, and immediately outboard again the main paired landing wheels.

As on the glider, provision of stick-free stability has been one aim underlying the design of the A.W.52. This is achieved to a great extent by the corrector surfaces which offset the considerable change in trim occurring when elevator or flap movements are made A diagram on following page shows the relative movement of flap and corrector surfaces, the two controls being interconnected.

The flaps have the same proportions as on the glider but are relatively smaller and, because of the necks occasioned by the jet pipes, a Hobson hydraulic remoter system is fitted to synchronize the movement of the sections.

The function of the correctors, which are hydraulically operated, is to provide a powerful trimming device without impairing the lightness of the controllers. The controllers, of course, combine the normal duties of elevators and ailerons. In addition a slotted landing flap with moderate backward travel is employed. This is because large changes of trim are to be avoided in tailless aircraft. The single tap carried on each controller combines geared link-

Opening of the new world of adventure



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TWIN-JET A.W.52

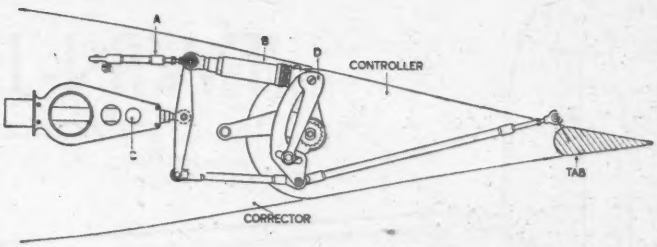
age and spring operations, and can also be operated from the trim control in the cockpit.

Dealing more specifically with performance and constructional features of the mailplane, it should be stated that it is all-metal (the glider was all-wood), has a span of 90ft, and weighs 32,700lb. It has a comparatively low wing loading of 24.8 lb/sq ft and a maximum lift coefficient, like that of the glider, of 1.6. Its purpose is the investigation of control and stability problems, and while primarily an experimental type, it is required to carry a load of mail. Other important data may be found in the table.

Performance with two Rolls-Royce Nenes, each giving 5,000lb maximum thrust, will be outstanding, and first flights should be made during January. If the aircraft lives up to expectations, and with the practical experience with the glider behind it there seems to be no reason to doubt this, it may truthfully be described as the first of a new order.

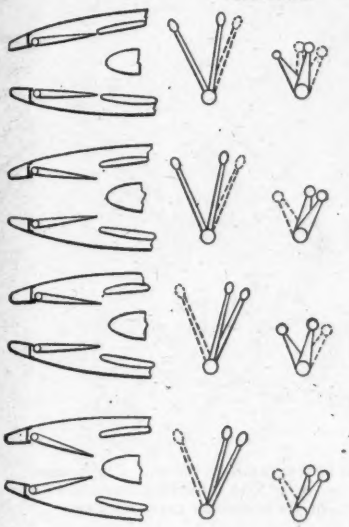
Space permits only a brief reference to construction but the main interest lies in the laminar-flow wing, which has a contour accuracy within two thousandths of an inch. This is achieved by the method of construction which is a development of the Whitley and Ensign box spar and thick skin arrangement. In that surface accuracy is required it is desirable to build from the skin inwards to avoid cumulative errors. For this method the wing ribs are produced in halves, and thus the upper and lower surfaces of the wing can be manufactured separately.

In constructing wings for the A.W.52 the skin is held in position against a former, stringers are then built-up on the skin, and the ribs follow. (A section was exhibited at Radlett.) The skin, being thick (16 or 18 gauge), must for economy take bending and shear stresses. The closely-spaced stringers are in the form of a corrugated inner skin, the effect being to split-up the main skin into very narrow panels and so limit local distortion. The inner skin also takes a proportion of the shear stresses. Wings produced in this manner suffer no weight penalty and, apart from the initial cost of the accurately-formed jigs, the method can be adopted for quick production. A small amount of fill-



Arrangement drawing of tab control. A, control operating rod; B, spring unit; C, screw jack for cockpit trim control; D, control lever and locking.

Diagram showing how the boundary layer suction flaps are controlled.

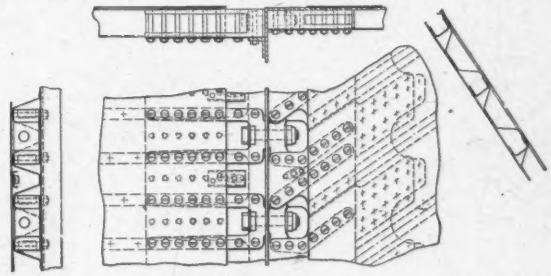


Stick forward to ⅓ aft of neutral position and throttle full open to 8,000 r.p.m.—flaps shut.

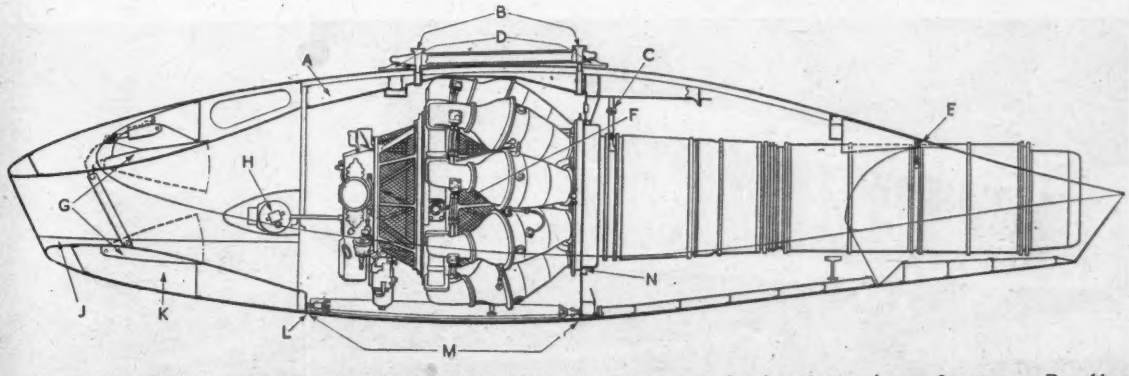
Stick forward to ⅓ aft of neutral, throttle 8,000 r.p.m. to shut—flaps 40 per cent open.

Stick ⅓ aft of neutral to full aft, throttle full open to 8,000 r.p.m.—flaps 30 per cent open.

Stick ⅓ aft of neutral to full aft, throttle 8,000 r.p.m. to shut—flaps 80 per cent open.



Details of the bolted joint between outer wing and centre section, and of the reinforcement of the skin on each side.



Layout of the A.W.52 engine nacelles. A, sheet steel walls of engine plenum chamber also serving as fire screen; B, cable guides for standard 2,000 lb. bomb winches to hoist power unit; C, engine rear attachment point; D, pressure pads for use with engine lifting winches: E, swing link supporting tail pipe; F, port engine mounting trunnion; G, intake flaps controlling boundary layer suction; H, remote accessory gear box; J, break of detachable section of lower intake duct; K, lower chamber connecting with suction ducts; L, front key-operated quick-release catch for inspection door; M, extent of side-hinged door giving access to Nene power unit; N, clearance for cooling air to jet pipe.

TWIN-JET A.W. 52 . .

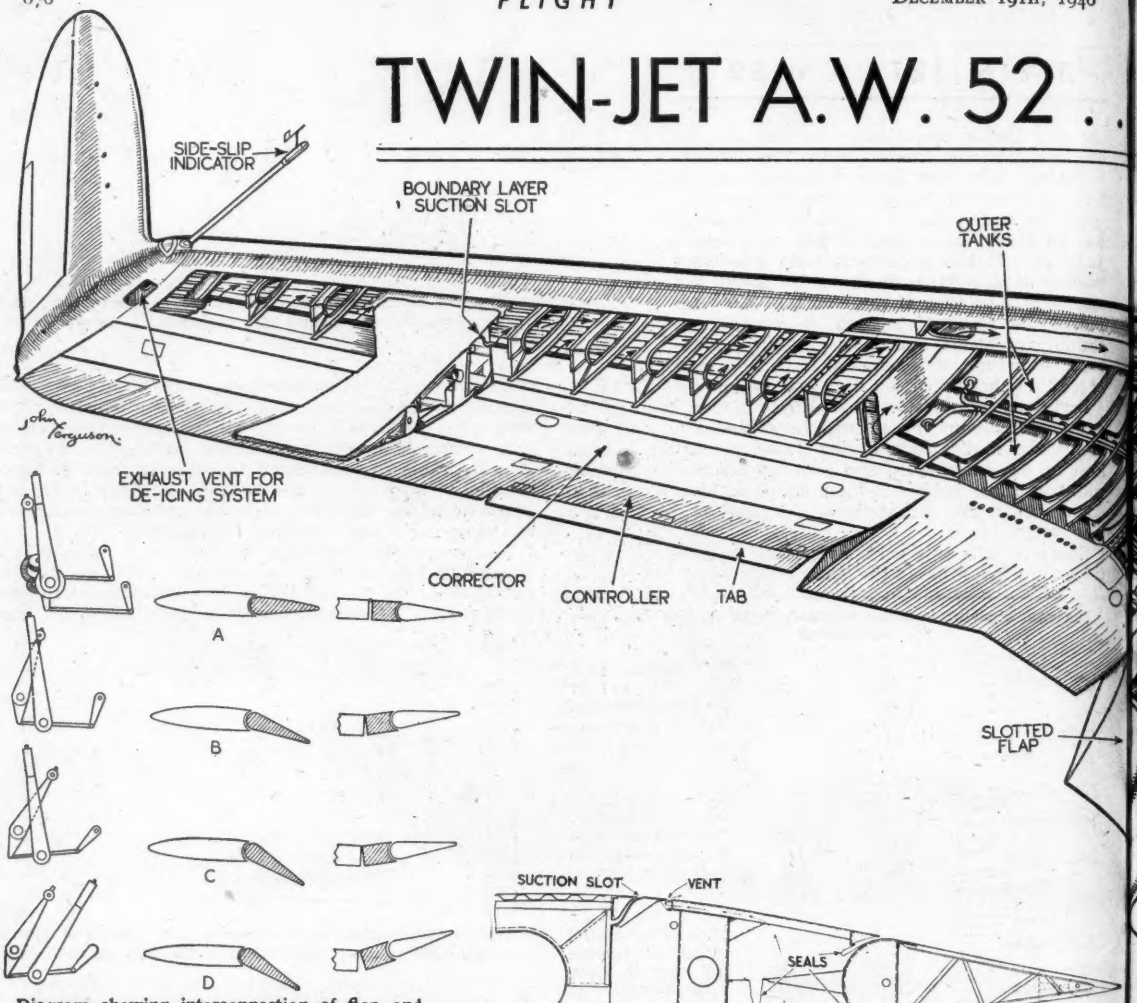
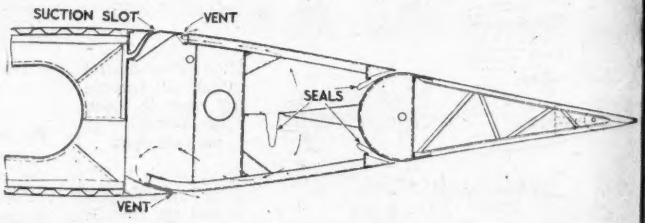
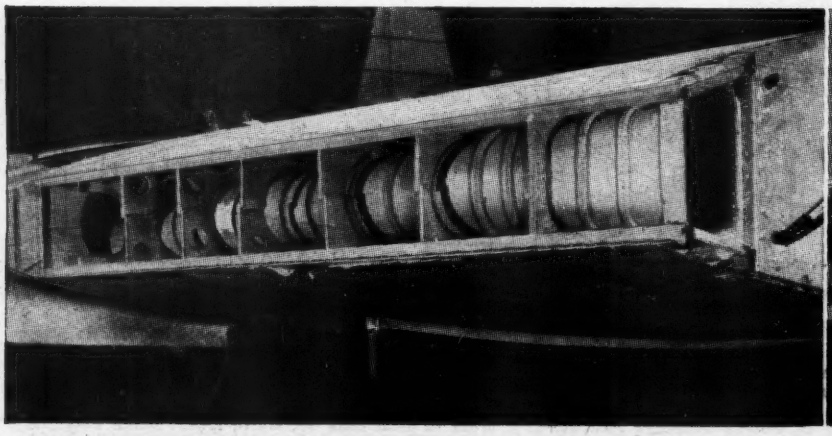
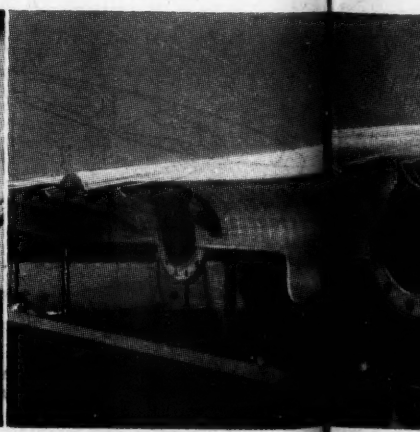


Diagram showing interconnection of flap and correctors, (flap lever has round head). A, flap up, corrector neutral; B, flap down 20 deg, corrector up 4 deg (2/3 of half travel); C, flap down 40 deg (full travel), corrector up 6 deg (half travel); D, flap down 40 deg, corrector up 12 deg, (6 deg from flap lever+6deg from corrector lever). Both levers operate through hydraulic remoter controls.



The corrector, controller and tab in diagrammatic form. The pressure seal and the upper and lower vents for the controller are shown in detail as also is the suction slot for boundary layer removal.

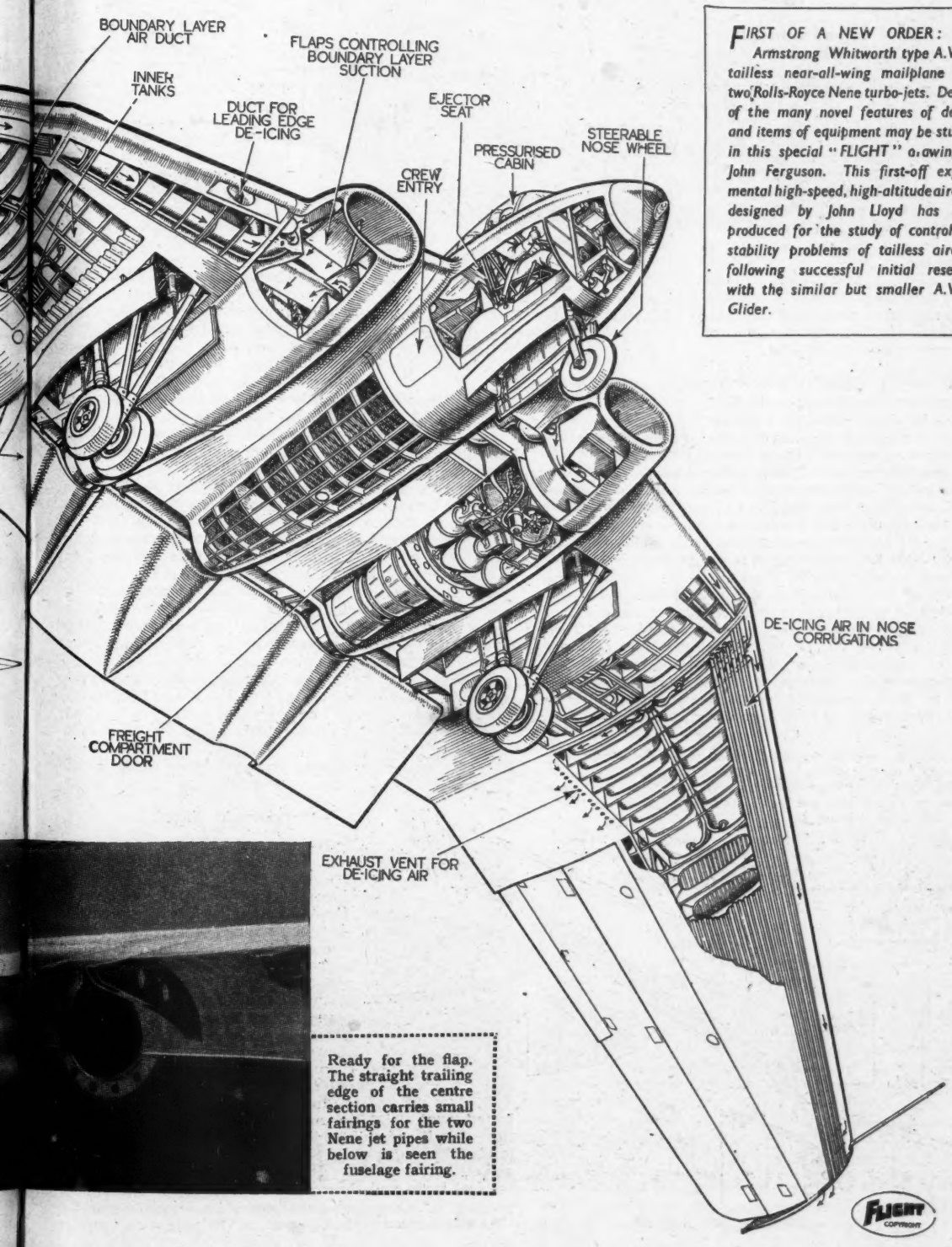




One of the boundary layer suction ducts in the centre section leading edge.

Sectioned Drawing of Britain's First Jet-propelled Experimental Mailplane Showing Layout of Boundary Layer Control and Thermal De-icing Systems

FIRST OF A NEW ORDER: The Armstrong Whitworth type A.W.52 tailless near-all-wing mailplane with two Rolls-Royce Nene turbo-jets. Details of the many novel features of design and items of equipment may be studied in this special "FLIGHT" drawing by John Ferguson. This first-off experimental high-speed, high-altitude aircraft designed by John Lloyd has been produced for the study of control and stability problems of tailless aircraft following successful initial research with the similar but smaller A.W.52 Glider.



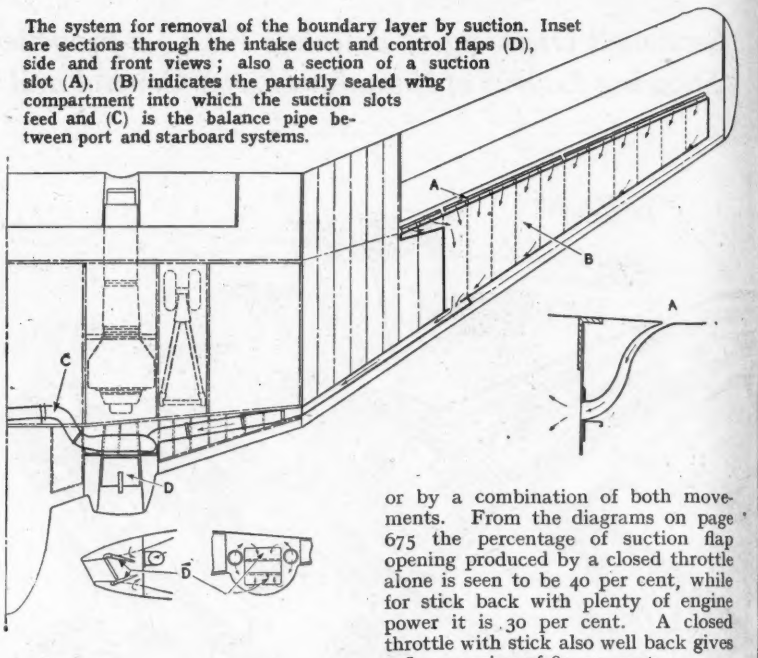
Ready for the flap. The straight trailing edge of the centre section carries small fairings for the two Nene jet pipes while below is seen the fuselage fairing.

ing is used at the skin joints of the main section with the nose portion (the nose section occupies only 4 per cent of the chord), and elsewhere the rivet heads are milled off with a mower-type cutter and a normal surface finish added. The outer wing is bolted to the centre section through a number of small fittings situated just under the skin surface and themselves bolted to the inter-skin stringers, which are reinforced near the joints. Details may be studied in the drawing.

Whereas the outer wing has no true spars, the centre section must have main spanwise members if only to bridge the engine and undercarriage bays. In this the sections differ in construction.

The all-wing desig has a fundamental advantage of weight distribution over a large portion of the span, thus shear and bending moments on the centre section are reduced.

The system for removal of the boundary layer by suction. Inset are sections through the intake duct and control flaps (D), side and front views; also a section of a suction slot (A). (B) indicates the partially sealed wing compartment into which the suction slots feed and (C) is the balance pipe between port and starboard systems.



Boundary-Layer Control

To remove the boundary layer in front of the control surfaces by suction, a series of narrow slots, 0.25 in wide, are placed spanwise along the wing surface. Ducts from the slots lead through the "spar" webs to two large compartments formed one in each outer wing between the webs, known as settling chambers. These chambers, which are partially sealed, are in turn connected to the compressor intake ducts. The suction slots are positioned at about 0.5 chord from the leading edge. The wing section is designed to give laminar flow back to 0.55 chord.

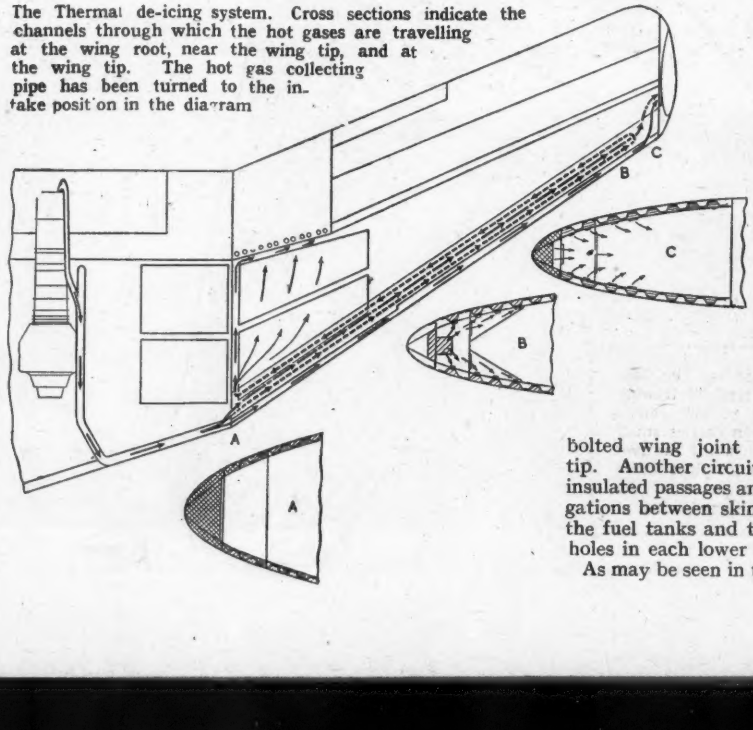
Control of the degree of suction is automatic. The connecting pipes to the engine intake ducts feed into a compartment around the ducts just behind the leading edge, and an upper and a lower flap valve opens into the duct, which at that point is of converging square section. A balance-pipe is also fitted between the power units. Control of the flaps is effected in one of two ways, either by closing the throttles or by pulling the stick right right back or by a combination of both movements. From the diagrams on page 675 the percentage of suction flap opening produced by a closed throttle alone is seen to be 40 per cent, while for stick back with plenty of engine power it is 30 per cent. A closed throttle with stick also well back gives a flap opening of 80 per cent.

It is assumed that in normal circumstances the aircraft will only approach the stall under one or other of these conditions, which could be expected to occur on the approach, on hold-off for landing, on a glide, on a sudden steep climb, or in tight turns. The overshoot or landing recovery cases, in which at low speeds full power would be used with stick central or forward, are not at present provided for. It is undesirable to add another control for the pilot, but a flap override-lever in the cockpit might prove useful.

The layout of the suction system is illustrated above, and as already mentioned this may be the first stage towards the complete withdrawal of the boundary layer to supply the full air requirement of power units, thus eliminating forward-facing intakes.

A point worthy of note is that as a result of the suction demands, idling speed on the turbo-jets has to be increased by about 2,000 r.p.m. This has its compensation, however, in their quicker response when opening the throttle. The actual loss in thrust from the engines is 300 lb with suction flaps fully open.

The Thermal de-icing system. Cross sections indicate the channels through which the hot gases are travelling at the wing root, near the wing tip, and at the wing tip. The hot gas collecting pipe has been turned to the intake position in the diagram

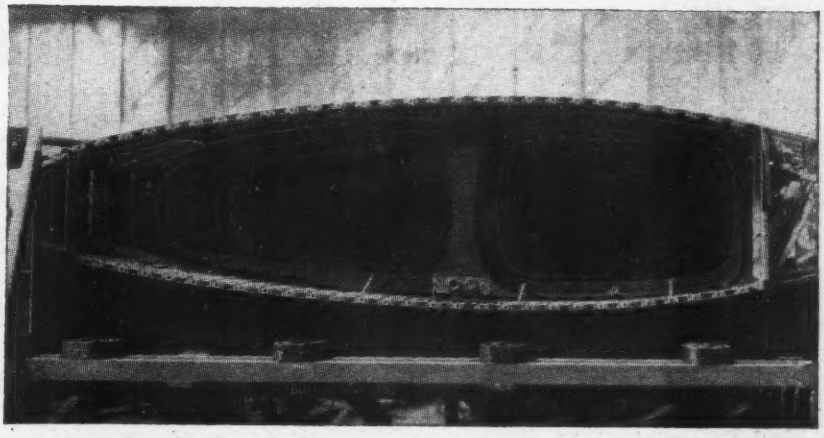


Thermal Anti-icing

Another service provided by the Nenes is in connection with the prevention of icing. This is achieved by direct heating of the wing nose sections by by-passing hot gases from the jet pipes. A rather elaborate circulation system is needed to maintain an approximately even heat supply to all portions of the leading edge. A diagram is given, left. Some of the hot gas stream is led to the wing-tip outlet point through the main nose channel, and some through alternate corrugations between the inner and outer wing skins. The area concerned is from 13 per cent chord at the bolted wing joint to 20 per cent chord towards the tip. Another circuit leads direct to the wing tip through insulated passages and returns through the remaining corrugations between skins. It is exhausted into the wing near the fuel tanks and then out through twelve small circular holes in each lower wing surface.

As may be seen in the diagram, a "walking stick" pipe is

TWIN-JET A.W.52



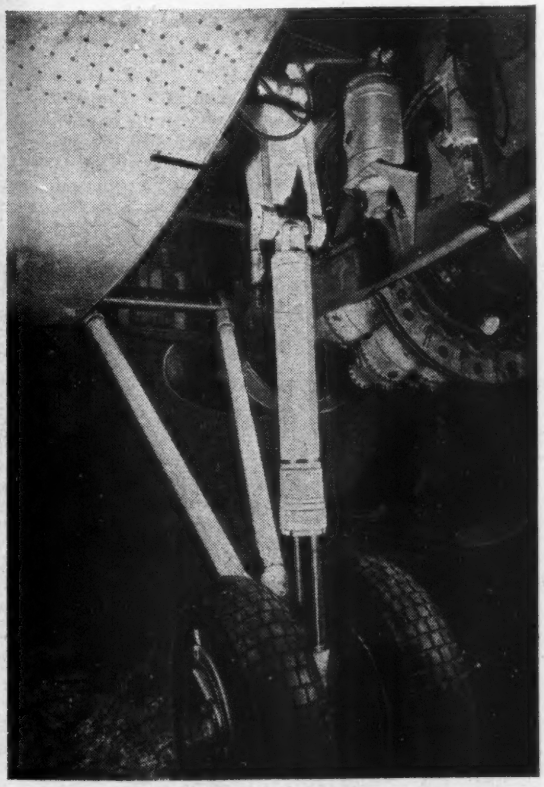
Details of wing ribs and double skin may be seen in this photograph. Fuel tanks fit into the two cavities.

placed just behind the nozzle and this can be turned into or out of the stream as required. The hot gases taken in are then mixed with cold air, the entries being thermostatically controlled to provide the correct supply temperature to the ice-prevention system. Ram effect causes the circulation.

The Nene nacelles are almost completely buried within the wing, but the intakes extend forward of the leading edge continuing the surface profile. Wide slits at the mouth open up into roughly square-section intake ducts. These, as explained, contain upper and lower suction control flaps and lead to the pressure or plenum chambers in which are contained the power units. The thin steel walls of the chambers also serve as bulkheads in the event of fire. The jet pipes pass through the rear steel walls immediately behind the turbines.

Differential pressures up to 5.5 lb for the crew compartment are provided from a Nene compressor; the engine also produces the requisite heat.

Eight fuel tanks are carried in all; two just inboard of each wing knuckle, and two more immediately outboard. The fuel cocks are the electrically operated type and are accessibly placed inside the wheel wells. For the benefit of the eagle-eyed readers it must be mentioned that two very small scoops under the wings are vents for the fuel systems.



Twin wheels are used with the rearward folding tricycle landing gear. The track is 21ft 7in.

The tricycle arrangement of the landing gear and the twin main landing wheels are apparent from the G.A. drawing. The undercarriage is a Dowty product and has been designed with a very long vertical travel. By this means, in an emergency, i.e., blind landings, the aircraft could be flown straight on to the ground without flattening out.

The wheels fold rearwards and up between the wing spars. Each wheel has a main vertical shock absorber unit leading to a sturdy "Y"-shaped retracting link, and two radius rods stretch forward in V form. The nose wheel tucks up into a well in the pressurized fuselage unit.

Dive-recovery flaps are to be fitted, though perhaps not at the outset. They are positioned in the lower centre section wing surface, beneath the fuel tanks, and will be hydraulically operated. The span of each is 63in, the chord 10in and the movement is fixed for two open positions, 30 or 45 deg.

A small but important feature is the ability to lock all flying controls from the cockpit, thus avoiding the need for external clamps and the like.

A full complement of instruments is provided and all control forces and angular displacements will be recorded in flight by automatic observers.

Sir Ben Lockspeiser's Introduction

On the occasion of the official inspection of the A.W.52 at the Baginton works, Sir Ben Lockspeiser, Chief Scientist of the Ministry of Supply, recalled that at a previous meeting on July 18th, when referring to airframe and power plant design, he had said that one of the main lines of advance was the achievement of very much lower drag, and that the logical conclusion was the tailless type of aircraft which also offered the advantage of reduced structural weight. He added that no designer could go forward with any confidence in the design of a large tailless aircraft without new data, and with a long term objective of an all-wing aircraft of over 100 tons with jet engines buried in the wing to give the cleanest possible design and the lowest drag, Armstrong Whitworth's had been asked to build a glider model to provide data for the A.W.52 which in turn would provide data for the large all-wing aircraft.

He stressed that the 52 had not been built to any operational requirement, but as an experimental type, in the belief that quicker progress would be made this way than by attempting to meet some operational need on inadequate data. He said that great credit was due to the designer Mr. J. Lloyd, and for production to Mr. H. M. Woodhams the General Manager, and all the men in the shops. Whatever the result of the experiment, the aircraft was a credit not only to the firm but to British engineering.

Model Aircraft on Show

Third National Exhibition at Dorland Hall

By N. D. RYDER

ONE of the chief things always stressed by those devoted to the designing and construction of model aircraft is that their products are not toys; they are real aircraft in miniature. Another and equally important point made is that the creation of model aircraft is more than just a hobby; it is a very fine means of training air-minded youth in the principles of aerodynamics and the fundamentals of aeronautical science and engineering.

These things have been said so often that probably even the Great British Public has more or less grasped them, and so the young aeromodeller is no longer in much danger of having his productions referred to as "toys" by inappreciative relatives, or his painstaking efforts regarded as a childish waste of time.

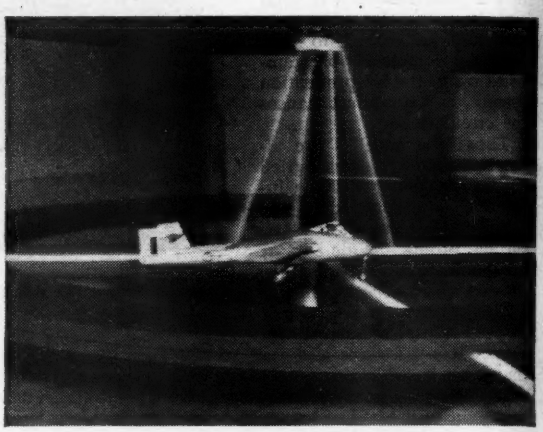
So far so good, but what the enquiring visitor to the Third National Model Aircraft Exhibition, now running at Dorland Hall, Lower Regent Street, London, W.1, may discover for the first time is that the design and construction of model aircraft is no longer merely the pursuit of the enthusiastic amateur; it has blossomed into an industry. For of the stands numbered one to 17, all but No. 13 are occupied by firms catering for the needs of the aeromodeller, from raw materials and literature to finished models and miniature engines. Stand No. 13 displays some of the appliances and machines developed by the A.B.A. research department at Eaton Bray, sponsored by *The Aeromodeller* which is allied with the *Daily Express* in the staging of the exhibition.

Scale Model Vampire

Amateur designed and built models, which embrace gliders and sailplanes as well as powered models of various types including flying boats, occupy a comparatively small section of the exhibition and are the prize-winning pick of a total entry far too big to be accommodated.

Of particular interest is a model Vampire, developed at Eaton Bray, which is powered by a miniature air jet-propulsion unit comprising a double-sided impeller giving a 2oz thrust at 10,000 r.p.m. and driven by a one-ninth h.p. electric motor. This model, as also are three others, is tethered to a centre pylon to retain it in circular flight and also to supply the electric current, but how much of the lift is provided by the wings and how much by centrifugal force is a matter for speculation.

These models are known as R.T.P. models (meaning simply "Round the Pole") and the Vampire has the distinction of being the first jet-propelled model to be demonstrated to the British public; it also has an impressively long take-off run! Also a "first" among models is the catapult-launched floatplane which is demonstrated (R.T.P.) in a large circular pool occupying the centre of the hall. This is single-engined high-wing type with twin floats and, since it perforce maintains a constant radius, the launching catapult automatically submerges the moment the aircraft is airborne, so as to be out of the way while the model circles a foot or so above the water.



RESEARCH IN SCALE: This model Vampire, developed by the A.B.A. research department, is the first jet-propelled miniature aircraft to fly and is demonstrated at the exhibition.

The exhibition, which continues until January 11th, was formally opened last Thursday by Lord Henderson (in the unavoidable absence of Mr. Noel-Baker) who referred to the excellence of the models, the value of aeromodelling, and then went on to deliver a recruiting oration for the R.A.F. In the course of this he gave some words of encouragement to the A.T.C. He announced that, in future, cadets holding the proficiency certificate who wished to join the R.A.F. would be guaranteed entry so long as they were medically fit, and there were vacancies.

THE AVIATION CENTRE

ALL aviation activities of the Royal Aero Club have now been transferred to Londonderry House, Park Lane, London, W.1, generously placed at the Club's disposal for 21 years at a peppercorn rental by the Marquess of Londonderry. The portion acquired by the Club includes all the main reception rooms, which will be largely furnished with the original furniture and pictures, kindly loaned by Lord Londonderry. Office accommodation has been provided for each of the aeronautical bodies affiliated to the R.Ae.C., such as the Association of British Aero Clubs, the British Gliding Association, and the Society of Model Aeronautical Engineers.

Accommodation has also been allotted to certain other representative bodies, such as the Guild of Air Pilots and Navigators, the Aerodrome Owners' Association, and the British Air Charter Association. The Aviation Centre will have available large assembly rooms which can be used for meetings, conferences, receptions and similar occasions.

The cost of maintenance, and of reinstating the premises (they were considerably damaged by enemy action and military occupation) will be considerable, and a special fund has been opened for those who wish to contribute towards this excellent cause. It is hoped to raise a total of at least £25,000 and it is proposed to hang in the entrance hall a scroll with the names of individuals and firms which have contributed sums of £250 and upwards towards the cost of establishing the Centre. Donations should be sent to the Secretary-General of the Royal Aero Club, Colonel R. L. Preston, at 119, Piccadilly, London, W.1. Very considerable sums have been contributed already.

Contributors to the Londonderry House and Aviation Activities Fund.

	£ s d
Alan S. Butler	100 0 0
F. Francis	100 0 0
Wing Commander N. Roy Harben	250 0 0
Captain Sir Geoffrey De Havilland	10 10 0
J. W. Hick	5 5 0
Captain A. G. Lamplugh	10 10 0
Lieut-Colonel Sir Francis K. McClean	10 10 0
H. W. H. Moore	10 10 0
Sir Frederick Handley Page	1,000 0 0
Sir William and Sir Reginald Rootes	250 0 0
W. S. Shackleton	5 5 0
H. Oswald Short	250 0 0
Whitney W. Straight	500 0 0
The Duke of Sutherland	500 0 0
Charles Sutro	100 0 0
G. H. Wilson-Fox	10 10 0
Frank Woodhead	250 0 0

A further list of donations will appear in our next issue.

GOOD VALUE : Whatever may have been the outcome of the Indian discussions here, air transport must be given credit for making them even possible. In this photograph the Lancastrian is preparing to leave Heathrow with Pandit Nehru and Sardar Baldev Singh on Board.

Hong Kong Airport : First Atlantic Freight Schedule : New Charter Company

CIVIL AVIATION NEWS

FOUNDATION FOR I.C.A.O.

THE interim council of P.I.C.A.O. went into recess on November 18th, after ten weeks of arduous work which resulted in many decisions, resolutions, and recommendations concerning future policy. One of the first items which will be submitted to the first assembly of I.C.A.O.—the permanent body tentatively scheduled to meet on May 6th, 1947—will be the draft agreement with the United Nations which has been designed to establish a relationship between the two bodies.

The relations which I.C.A.O. is to have with other international organizations was decided. The utmost co-operation with I.A.T.A. and F.A.I. is to continue. At a meeting of the Fédération Aéronautique Internationale in London in September, Lord Brabazon of Tara said he proposed to establish committees parallel to those divisions of P.I.C.A.O. which are of principal concern to the F.A.I. In future, he said, it may be considered necessary in the interests of the F.A.I. to establish a general secretariat of that organization at the site of the headquarters of P.I.C.A.O. During November the C.I.T.E.J.A. held its conference on private air law, and one of the major items for discussion was the question of the future absorption by I.C.A.O. of this body, making it a part of the legal committee in the permanent organization.

The standardization of units used in measuring height, distance, speed, pressures and so on, has been given detailed attention, and the council has approved the recommendations of the Air Navigation Committee. Member States are being asked by questionnaire to signify any objections to the units suggested. During the session the council received a cable from the Director of Civil Aviation at Reykjavik, stating that the Icelandic authorities felt that they could not tolerate beyond November 21st the interference with marine services caused by the operation of the Loran station in Iceland. A request was subsequently made to the Icelandic Government to withdraw the objection pending the outcome of the current meeting of the Radio Technical Division, which is studying standardization of navigational aids, and also of the Telecommunication Conference which will review next spring the present frequency assignments.

In connection with air traffic control over the European-Mediterranean region, the council has appoved the amendments recommended at the recent air traffic meeting in Paris. It is understood that the United Kingdom has expressed grave doubts whether the "corridor plan" can be safely operated during the coming winter, and has suggested that another air traffic control meeting should be called this month to reconsider the whole position.

Facilities in Middle East

The Air Traffic Control Committee has recommended a plan for the Middle East region which provides Flight Safety Regions with centres at Cairo, Khartoum, Basra, Aden, Karachi and Bangalore, and one control area with the control centre at Cairo. The Communications Committee studied the existing "fixing" services and air-to-ground communication facilities in the Middle East region, in connection with air traffic control, search and rescue, and meteorological requirements. Detailed lists of existing and proposed services were prepared and a plan was evolved for a meteorological broadcast service in the region, which is to be introduced as soon as possible.

During its deliberations the Search and Rescue Committee found that available facilities were extremely few in number and were inadequate to provide proper protection for the Middle East region. At the same time, the committee felt that there would be little financial support for extensive search and rescue facilities, and in consequence they were unable to recommend additional facilities beyond those which the delegates had stated could be made available. At the next meeting, the committee will consider what degree of assistance could be given to provide search and rescue facilities in those States unable to provide adequate facilities from their own resources, and to what amount the establishment of facilities would be justified.

Among the general recommendations which were made, the following are interesting: All search aircraft should be provided with survival equipment which may be dropped from the air; facilities should be provided for search and rescue aircraft, equipment and personnel to cross national borders when on search and rescue operations; visits should be encouraged between rescue organizations for the purpose of familiarization and liaison; literature and all information on search and rescue for the co-ordination of operating technique methods and procedures should be submitted.

The Organization has been committed to the publication of a manual covering those regions in which P.I.C.A.O. regional air navigation meetings have been held. The subject-matter of the manual will include all procedures, including flying procedures which are strictly regional in character, flight data in the form of charts and tabulations, and airfield and instrument approach charts in colour.

Recommendations made by the Meteorological Division were recorded in *Flight* last week, and those of the special Radio Technical Division the week before.

FAR EASTERN FOCAL

NO final decision has apparently yet been made on the airport to be constructed at Hong Kong. As announced in *Flight* of August 29th, plans have already been drawn up for the construction of a modern airport costing between three and four million pounds. Approval from London is necessary before any further progress can be made, as the Imperial Government will have to bear the greatest portion of the initial cost.

If the plan under consideration is accepted, construction will involve several major engineering feats, one of which would be the dynamiting of about four million cubic yards of granite to be used for reclaiming the western shore of Deep Bay. It is expected that the work would take probably two years to complete, during which time the airport at Kaitak would continue to be used. Kaitak has been considered unsuitable for many years, primarily because of the hills on the north side.

Several other sites were recommended, one at Eastern Lantao, and another on reclaimed land inside Kowloon Bay. A site at Pingshan, slightly to the south of Deep Bay, was considered at one time to be particularly suitable, especially in the

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view of certain engineers who had estimated the approximate cost of construction to be only about 1½ million pounds. Lord Knollys, chairman of B.O.A.C., and others were opposed to this site on the grounds that it would not be suitable for international aviation purposes. It is understood that official and unofficial Chinese protests had been made because of its proximity to the Hong Kong-Chinese border. Suggestions were made at one time for the adoption of a floating airfield, a war-time development considered by some as suitable for this particular site. It was argued that a floating field could be brought near to the island, making connections between the airfield and the centre of Hong Kong easy.

Kaitak is in the meantime an important international airfield, with at least six airlines operating regularly through and from there, and several companies are using it for non-scheduled operations. Amongst the users are B.O.A.C., who at present run a weekly service to the United Kingdom and a shuttle to Singapore, and it is believed that the Corporation plan to increase these to two a week, and extend the service to Tokio through Shanghai. R.A.F. Transport Command still carry passengers twice a week to Singapore via Saigon, and to Calcutta through Bangkok and Rangoon, and occasionally to Japan through Shanghai. These services are limited, however, to priority bookings and will, when B.O.A.C. are able to provide the necessary services, be discontinued.

Another user is the China National Aviation Corporation. The ownership of this concern is divided; 80 per cent of the shares being owned by the Chinese Government and other Chinese interests, and 20 per cent by Pan American Airways. The general manager is Chinese and the operations manager is American. The captains of aircraft are all Americans, but other aircrew are mostly Chinese. The aircraft used by this company are Douglas C-46s, 47s and 53s, and services are run from Kaitak to Shanghai, Hainan, Hankow, Nanking, and Chungking. A new line to Singapore is being planned.

The Chinese Government, through the Ministry of Communications, owns another airline, the Central Air Transport Corporation, which flies schedules from Kaitak to Shanghai, Chungking and Kunming, using Dakota and Commando aircraft. In this Corporation there are several foreign captains, but most of the aircrew are Chinese who have served in Canadian or American Air Forces. C.N.A.C. and C.A.T.C. are the only two companies allowed to operate the internal services in China, but permission from the Government is awaited by a third company to be known as Dah Hwa. There are several companies in Manila operating Skymasters and other American aircraft to some of the main Chinese towns. Competition is keen, but it is thought that the preference given to aviation by the travelling public in this part of the world will allow considerable expansion.

Cathay Pacific Airways, operating from Kaitak, are doing considerable charter work and specializing in inter-Empire air communications, using British aircraft for both cargo and passenger work. It is understood, too, that Pan American Airways were negotiating with the Portuguese Government for the resumption of facilities at the flying-boat base in Macao. However, since they are now concentrating on land-planes and stops are being made at Hong Kong, these negotiations have now ceased.

On the training side the Far Eastern Aviation Company, which was operating before the war at Kaitak and which trained a large number of pilots who eventually flew in the Services, has resumed operations. The management and flying instructors of the school are all British. Although this airport at Kaitak is congested and will remain so until the new airport is built at Deep Bay, the school has sufficient space for instruction and training, and it is the company's intention to expand its flying programme.

DOUBLE BUBBLE: A sectional view of a Stratocruiser under construction. B.O.A.C. have ordered six of these aircraft for the Trans-Atlantic route.

TRANSATLANTIC FREIGHTER

LAST week American Overseas Airways made the first flight of their transatlantic freight service. The Douglas DC-4, which has been specially equipped and allocated to this, the first scheduled transatlantic freight service, has been named Flagship Air Freighter, and will fly once a week each way between New York and London.

It is not the intention of A.O.A. at the moment to fix the day of departure in either direction, but the company will increase the service as soon as the aircraft situation permits and, naturally, provided that the demand is sufficient. Present indications are understood to be very promising. The first cargo included 9,000 lb of fountain pens for Paris and 3,000 lb of mixed goods for U.N.R.R.A., Belgrade.

CHANGE OF APPOINTMENT

MR. MAURICE CURTIS has resigned his appointment as traffic manager of British European Airways in order to join Skyways. It is understood that he will shortly be going to China on an exploratory mission for the company, who intend to open an air service for the carriage of freight throughout China and the Far East. Lancastrian freighters will be used. Headquarters for the time being will be in Hong Kong, where agreements will be sought and all necessary arrangements for maintenance and other facilities will be made. It is thought possible that it will be necessary to move the headquarters into China at some later date. Mr. Curtis was at one time the Hong Kong manager for Imperial Airways and B.O.A.C.

The new traffic manager for British European Airways will be Mr. Ian Scott-Hill, who has been brought from the position of B.E.A. manager at Brussels. Mr. Scott-Hill, who is thirty-one, joined Imperial Airways in 1933.

ANOTHER STALL INDICATOR

THE Kollsman Instrument Division has recently announced the near-production of an angle-of-attack indicator. Although no detailed information is offered about its method of operation, this instrument involves the use of a moving vane which, in effect, is used to measure the angle at which the airflow arrives at the leading edge. The indicator shows both the approach of the stall—whether normal or high-speed—and also, with the help of previous calibrations, the most efficient flying angle. So that, apart from its doubtful use as a stall indicator it may have very real value in the matter of economical transport operation. The suggestion is that, in addition to the normal instrument indication, an audible or visual warning should be included to remind the pilot of the approach of dangerously high angles of attack.

There is very little really new about this Kollsman indicator. Some twenty years ago a device known as the Savage-Bramson anti-stall gear was devised over here. This gear not only indicated the approach of a stalled condition, but was also arranged to take the necessary recovery action. Rather more than a year ago—in *Flight* of July 12th, 1945—we also described the Baynes speed-range indicator, which gave readings of the amount of G being applied to the aircraft in proportion to the speed at which it was being flown. This would provide information somewhat similar to that obtained from a more directly operated angle-of-attack indicator.

ENGLISH–AUSTRALIAN CHARTER

MANAGED by British Aviation Services and starting operations with three Avro Lancastrians and some Dakotas, a new charter company has recently been formed by British and Australian mining and financial interests. It is known as Silver City Airways because of the associations of the chairman, Mr. J. R. Govett, and another director, Mr. W. S. Robinson, in Broken Hill, Australia—which was originally known as Silver City. The managing director is Air Cdre. G. J. Powell.

Two of the three Lancastrians were recently christened at Langley, Slough, by Mrs. Powell and Mrs. Govett respectively, and all three have already made their first trips—one to Johannesburg and Sydney, another to Karachi and Johannesburg, and a third to Malta. These Lancastrians are thirteen-seaters with, in addition, accommodation for 6,200 lb of freight.

Incidentally, on the flight to Malta the distance (1,340 miles) was covered non-stop in 4 hr 55 min. The Lancastrian was flown by Capt. J. A. Sauvage and Air Comdre. Powell and carried thirteen passengers and freight.

COMMERCIAL HELICOPTER OPERATION

OPERATING from Central Airport, Camden, New Jersey, a new firm, known as Helicopter Air Transport, has recently started operations. Apart from its unusual plans, it is of special interest to flying people in this country because the executive vice-president is Mr. Norman Edgar, who operated Western Airways in its earlier days and who, during the war, was with the A.T.A.

By way of giving a fillip to the National Air-mail Week, Helicopter Air Transport carried mail from La Guardia to Hackensack, N.J., from Philadelphia South West to the roof of the Philadelphia Post Office, and from the last point to five others throughout Pennsylvania. In addition to this more spectacular work, H.A.T.'s Sikorskys have been making a number of useful charter trips. Finally, in order to popularize helicopter flying, the company has also started a special school where, for the present, however, applicants must be rated as commercial pilots and have flown a minimum of 500 hours.

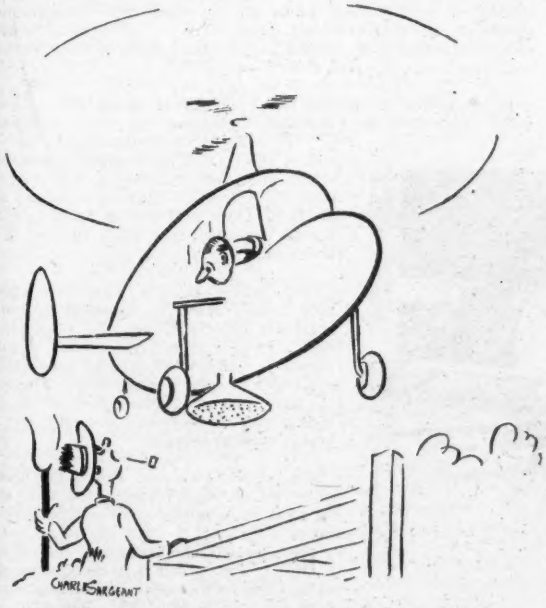
EUROPEAN BUSINESS

BRITISH European Airways expect by the end of 1947 to have a fleet of seventy aircraft flying on the Continental routes, and ninety on the United Kingdom internal connections. To fly these aircraft it is hoped to have 175 fully trained Viking crews and 46 fully trained Dakota crews.

During the past nine months passenger and freight traffic has increased progressively; for example, over 16,000 passengers passed through Northolt during October as compared with 4,000 in February. During the nine months between February and October, 100,000 passengers, involving more than 7,000 aircraft movements, were handled at the terminal by B.E.A. for themselves and other airlines. In the same period nearly six-and-a-half million pounds of freight was handled, and the steady increase is shown in the figures for February and October, when, in the first instance, ninety-five thousand pounds passed through the freight section, and in October a million-and-a-half pounds.

The Vikings operating on the eight routes to the Continent have been carrying a thousand pounds of freight in addition to the full passenger load, and the Dakotas on the other routes have carried two thousand pounds of freight in addition to passengers.

"CITY OF LONDON": Mrs. Powell, wife of the managing director of Silver City Airways, christening one of the company's new Lancastrians at Langley.



"Any drops cussted today—er—any crups dossted—cripes—Any drupps cossted—Hell! Carl I do a bit of weeding for you?

FROM THE CLUBS

AFTER an October which was the best flying month since July, there were, during November, only eight days on which flying was possible by the London Aeroplane Club at Panshanger. Nevertheless, and in spite of the continuous heavy rain, the airfield remained usable so that every advantage could be taken of brief interludes. The club will be closed between December 16th and January 7th inclusive.

* * *

For the benefit of those interested in the flying and development of small aircraft, an Ultra-Light Aircraft Association has recently been formed. The address of the association is 15, Westbourne Park Road, London, W.2, and the honorary secretary is Mr. R. W. Clegg. It is governed for the time being by an interim committee. The association came into being on October 26th, and was largely the result of the correspondence in *Flight* around the vexed question of amateur-built aircraft and permits to fly.

* * *

Five of the reconditioned Tiger Moths have now emerged from Herts and Essex workshops, providing a total fleet strength of eight Tiger Moths, one Hornet Moth and three Proctors. During November, 146 hours were flown in club aircraft in spite of the continuously poor weather, while, since the club opened in May, twenty-five "A" licences have been obtained and thirty-four renewed. There will be a return to pre-war conditions during the holidays, with a round of Christmas events. The club's magazine, "The Broxbourne Flier," is to be revived, with Sqn. Ldr. P. E. Hindmarsh as honorary editor, and a free-flying prize is being offered for the best article received for the first issue.

* * *

After being closed since 1939, the Bristol and Wessex Aeroplane Club's quarters at Whitchurch have now been reopened. The occasion provided the excuse for a reunion party, which

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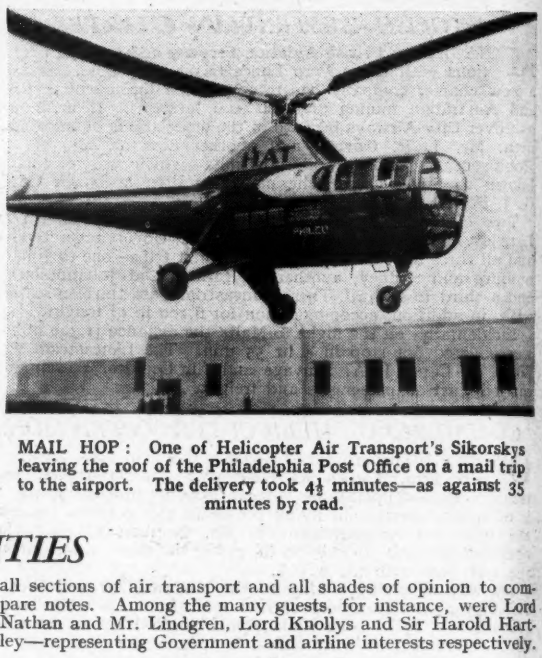
was attended by more than 250 pre-war members of the club. The chairman, Mr. R. Ashley-Hall, welcomed the guests and explained that, though the club now had ample facilities for its members, and three airworthy aircraft, there were now neither paid flying instructors nor paid secretary. The future of the club, therefore, depended largely on a return of the earlier spirit, when improvisation was the secret of success.

The club now has three Austers in action, the flying charge being £3 an hour for dual and solo. The squash court has been reconditioned and is now open. On March 7th the club is sponsoring a public meeting with the object of forming a local branch of the Air League, and application has been made through the R.Ae.C. for a date during May in which to hold the first meeting and air display at Whitchurch.

* * *

Since its reopening in July, the South Coast Flying Club has logged some 700 hours at Shoreham. Amongst recent events was a landing competition, with prizes for club members and private owners. The first went to Mr. Mannooch, with a club Tiger Moth, and the second to Mr. Carnegie, flying his own Moth Minor, which, well practised, he put down within seven feet of the marked point.



MAIL HOP: One of Helicopter Air Transport's Sikorskys leaving the roof of the Philadelphia Post Office on a mail trip to the airport. The delivery took 4½ minutes—as against 35 minutes by road.

BREVITIES

Lord Nathan is visiting Belfast this week to discuss the future of civil aviation in Northern Ireland with the Minister of Commerce, Sir Rowland Nugent. It is understood that he will meet the members of the Civil Aviation Advisory Committee for Northern Ireland.

* * *

United Airlines have taken delivery of the first of thirty-five Douglas DC-6s. Ten of these will be 26-passenger sleepers (with accommodation for 52 daytime passengers), and twenty-five will be 58-passenger types for daylight operations. The DC-6 might be described as a modernized version of the DC-4.

* * *

The South American manager of Airwork, Sir Richard Barlow, who was organizing the Shell Company's air operations in Ecuador, lost his life near Quito while on a flight with a Grumman amphibian. With him was Mr. O. E. Gates, the chief pilot of the Ecuador Shell Company, to whom the aircraft belonged.

* * *

Linea Aerea Nacional of Chile have ordered four Martin 202s. With these they propose to extend their operations over the Andes; these are at present limited to coastwise runs between Arica and the Tierra del Fuego region. L.A.N. was organized in 1932 to take over the civil air services of the Chilian Air Force, and is owned, operated and financed by the Government.

* * *

The British Air Lines Pilots' Association party at the Savoy last week—a party which is by way of becoming an annual event—was, once again, one of those better opportunities for all sections of air transport and all shades of opinion to compare notes. Among the many guests, for instance, were Lord Nathan and Mr. Lindgren, Lord Knollys and Sir Harold Hartley—representing Government and airline interests respectively.

* * *

South African Airways have ordered eight Vickers Vikings for the Johannesburg-Capetown service. Delivery of the first aircraft is expected to start next May.

* * *

Scheduled services between the United States and Germany have now been increased to five per week. The route from New York and Gander is through Shannon, Amsterdam and Frankfurt to Berlin.

* * *

Swissair started last week a new Skymaster service between London and Geneva. This supplements the Dakota schedules and will run at a frequency of two services in each direction per week.

* * *

Last week, with parties on two successive nights at which there were representative gatherings of airline and other personalities, Swedish Air Lines opened their new information offices at 185, Regent Street, London, W.1. The premises are indeed imposing both outside and inside. Much of the material used has been imported from Sweden.

* * *

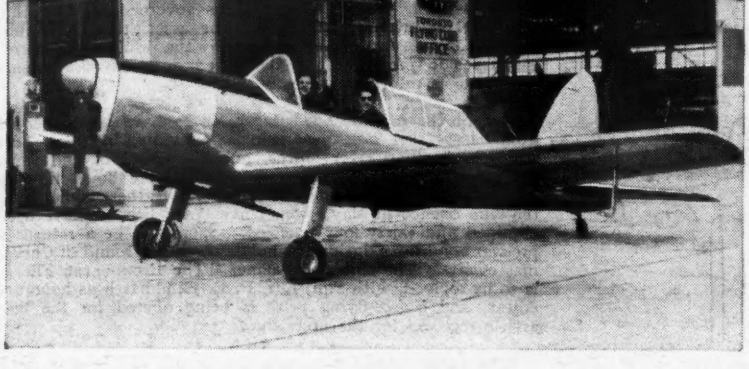
In the article describing radio equipment at the Paris show, which appeared in *Flight* of December 5th, the Airborne MF/HF receiver was illustrated. It is part of the special lightweight miniature AD.97/108 communication equipment, made by Marconi, which is standard in the D.H. Dove and is also fitted in the Bristol Wayfarer now on a tour of the Americas.

* * *

The Air Registration Board has issued three more *Notices to Licensed Aircraft Engineers and to Owners of Civil Aircraft*. Two of these, Nos. 6 and 7, are routine re-issues dealing with airworthiness requirements, but the third, No. 12, is a new one of some importance concerning the inspections necessary for a certain type of pipeline.

* * *

Mr. Albert Plesman, President-Director of K.L.M. since its inception on October 7th, 1919, is to have conferred upon him the title of Doctor Honoris Causa by the Senate of the Technical University of Delft. The award is in recognition of his services to the technical sciences. Mr. Plesman will receive the degree at a special ceremony on Wednesday, January 8th.



NUMBER TWO CHIPMUNK: The second of the all-metal trainers, being made by the Canadian D.H. Company, posed outside the Toronto Flying Club's premises.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers not necessarily for publication, must in all cases accompany letters.

ULTRA LIGHT AIRCRAFT

"Paris Show" Numbers of Flight

ON behalf of the committee and other members of the Ultra Light Aircraft Association, and of the many "impecunious flying enthusiasts" who have, admittedly, taken up so much space recently in your Correspondence columns, may I thank you for the excellence of the recent issues of *Flight* covering the Paris Aero Show? To so many of us who *are* impecunious when judged by our inability to afford existing club flying rates or to visit the Aero Show in person, your photographs, sketches and descriptions of the various exhibits represent the only means by which we can see what is new in the world of aviation.

We are indebted to you in particular for bringing us news of the interesting new types of ultra-light aircraft being produced in other countries. It is encouraging to note that, whatever may be the ideas of British aircraft firms, foreign manufacturers are not blind to the possibilities of aircraft in this category, and that they prefer to use the term "shallow pocketed" rather than the inaccurate word "impecunious" when describing the type of enthusiast to whom these ultra-lights will appeal.

But referring to your remarks in "The Outlook" (*Flight*, November 21st), is it not rather ironical that, while "every country with the exception of Britain is handicapped by the lack of suitable power units for its latest aircraft," this should be the one country in which the development of amateur flying is seriously hampered by lack of a suitable low-powered engine around which could be designed a popular ultra-light machine?

R. W. CLEGG
(Hon. Secretary).

THE FLYING CITIZEN

Daily-Press Treatment of Accidents

INDICATOR'S article in *Flight*, November 28th, deals with a subject of absorbing interest not only to the student of psychology, but to all in the aviation industry. On the "acceptance" of aviation by the man in the street depends the distance we shall travel along that prosperous road travelled by the motor industry.

It is true, of course, with regard to accidents, that pile-up piled on pile-up, as it were, would finish any form of transport. but assuming that flying does not kill more people per whatever measure you like to take, than other forms of transport, then the most important thing is not to draw disproportionate attention to the accidents. Report them in the papers by all means, but don't "splash" them.

I really think aviation should have a go at the newspapers on this point. As things stand, an editor is quite right from *his* point of view to headline air crashes because they are good saleable news. People like to be horrified, hence the popularity of thriller and crime novels, plays, films, etc. Being in the air is still a Martian, Wellsian—Jules Vernian concept to millions of people. To a certain extent I think this will always be so because man has no natural wings. Many dislike high windows and towers because man knows deep down that he is developed to function normally on terra firma. This feeling of disquiet when aware of the *possibility* (not necessarily *probability*) of any uncontrolled fall varies greatly with temperament and age, and degree of experience of the particular conditions, whether those conditions are, for instance, flying, mountaineering or steeplejacking. The feeling is also affected by the individual's judgment of the *likelihood* of a fall taking place. For instance, to the average person a parapet round the top of a tower will make him feel safer. So will he feel safer with the "solidity" of a Vickers Viking, than with the apparent flimsiness of, say, an AVRO 504; although the latter was probably just as safe structurally.

Even to-day, after 100 years or more of railways, a really mighty train crash takes the front pages every time. And you have only to compare the reports of the same crash as given in, say, *The Engineer* and *The Daily Express*, to see that the newspaper editor is selling what the man in the street enjoys, namely, horror. I believe in the old days of the Tuppenny Tube, one of the coaches came into a station with some smouldering woodwork due to a hot axle box. It was a trivial incident and the people merely got out of the coach into the next one. One of the evening papers, however, sold out an extra edition simply on the headline "FIRE IN THE TUBE: PASSENGERS ALIGHT." The editor knew what would sell his paper for him.

Man's instinct for self preservation makes him recoil from placing himself under the influence of natural forces which can destroy him, but he will do so if he believes those forces to be under control. His peace of mind under these conditions will range from complete tranquillity to great fear according to the amount of control he believes to be exercised.

The horrific prospect of destruction, however, fascinates him, and to hear or read of, or even to see others being destroyed gives him a feeling of pleasurable distress. In his youth he will deliberately risk destruction himself so that only chance can save him, solely for the sake of that momentary tautening of the nerves at the critical moment.

These primitive emotions are deeply rooted, but they can be stimulated or quietened. The headlining of air crashes undoubtedly stimulates them and at the same time retards that wider acceptance of the inherent risk of air travel, which is necessary for its full development. You will notice I do not say *greater* risk of air travel compared to other forms of mechanical transport, because I do not believe the risk is greater. The statisticians can tell us that anyway. But there is an inherent risk to which the man in the street has not yet become accustomed and the newspaper editors are retarding his acceptance of this risk. And by acceptance I mean placing it on the same level as all the other hazards of modern life; i.e., stripping it of its horrific glamour.

"Indicator" is right, of course, in his valuation of a ten or twenty year record of safety, but I believe the propaganda business also to be very important. Once again, I think the aviation industry should go bald-headed for the newspaper industry and see whether the editors cannot be persuaded to pass up what is admittedly news, and keep air crashes off the front page, at least for the period of aviation's adolescence—say the next twenty years.

J. S. POLE.

BOUQUET

Civil Servants Sometimes Are

IT is usual in these days to abuse the civil servants who play so large a part in the scheme of things, but not all are bureaucrats. Indeed, those I have had the pleasure of meeting in the Ministry of Civil Aviation are civil servants in the very best sense.

Hedged about as they are with a mass of regulations, they have a very real desire to help, and an inclination to give the affirmative answer to the many requests with which they are bombarded. In my quests for assistance of all kinds I have not experienced any refusal without logical explanation, courtesy, and real regret.

I hope, sir, you can find some small space to make this acknowledgment of a debt which the industry owes to the directors and their staffs at the Ministry of Civil Aviation.

GROUP CAPT. F. H. L. SEARL
(Managing Director),
Planet Aircraft, Ltd.

FORTHCOMING EVENTS

Dec. 19th.—R.Ae.S. London; "The Evolution o the Spitfire." J. Smith.
Dec. 19th.—R.Ae.S. Birmingham; "Pneumatics for Aircraft and the Aircraft Industry," arranged by Hymatic Eng. Co., Chamber of Commerce, 7 p.m.
Dec. 19th.—"Aerotech" Flying Club No. 1; "Formation and Operation of a Gliding Club." Mrs. Ann Douglas (Hon. Sec., B.G.A.).
Jan. 3rd.—I.Mech.E.; "The Development of Aircraft Hydraulic Machinery" (three papers). Messrs. H. G. Conway, S. M. Parker, and D.A.L. Robson.
Jan. 4th.—R.Ae.S. (Reading Branch); Annual General Meeting.
Jan. 4th.—British Interplanetary Society; "The Energy and Stability of Atomic Nuclei." Mr. L. R. Shepherd.
Jan. 6th.—R.Ae.S. (Medway Branch); "Design of a Two-seater Sailplane." Mr. F. M. Reynolds.
Jan. 7th.—R.Ae.S. (Belfast Branch); "Gliding." Professor Hill.
Jan. 7th.—R.Ae.S. (Bristol Branch); Brains Trust, with Capt. J. Laurence Pritchard as Question-master.
Jan. 8th.—R.Ae.S. (Southampton Branch); "Elementary Metallurgy of Aircraft Materials." Mr. A. Black.
Jan. 9th.—"Aerotech" Flying Club No. 1. "World Gliding." Flt. Lt. Vernon Blunt.
Jan. 10th.—I.Mech.E., "Fo Development and Shock Wave Investigation at Metro-Vick." Dr. Smith and K. Todd.
Jan. 10th.—R.Ae.S. Glouc. and Chelt.; "Liquid Springing." R. H. Bound, Dowty Works, 7.30 p.m.

SERVICE AVIATION

DEVELOPED TRANSPORT: This new picture of a Transport Command Avro York should be compared with that of the Lancastrian on page 687. The York, although using certain Lancaster components, has an unusually capacious fuselage and is certainly no "Lancaster modification."

Royal Air Force and Naval Aviation News and Announcements

Norwegian Honour for Group Capt.

AT a ceremony in London on December 5th the Norwegian Air Attaché, Lt.-Col. Joergensen, presented Grp. Capt. R. C. M. Collard with a bronze plaque for services rendered to Norwegian prisoners of war in Germany.

C.A.S. at Singapore

MARSHAL of the R.A.F. Lord Tedder, Chief of Air Staff, speaking in Singapore has said that this great base, despite the atom bomb, remained the focal point of Far Eastern defence. Lord Tedder confirmed that plans had been approved to develop Changi airfield as a Service and civil airfield for machines weighing up to 134 tons.

He added that he was still not satisfied with R.A.F. recruiting, but the ideal of a happy Service was closer. Conditions for R.A.F. personnel in Japan were not good but were improving. "I had a long talk with General MacArthur," said Lord Tedder, "and I was very impressed."

"Transport's" Christmas Effort

R.A.F. Transport Command will carry 50 tons of mail each week to overseas destinations during the next few weeks so that soldiers, sailors and airmen may receive greetings and gifts by Christmas. It will fly most of the Forces' mails to the Middle East and India and will convey 15 tons weekly. In addition it is providing airlift for about two tons a week to Singapore and beyond. B.O.A.C. will carry the remainder. The Command will also extend its services for the carriage of mails to the Forces in Germany and Italy.

Biggin Hill Chapel

THE Air Council are considering plans for a new Battle of Britain Memorial Chapel to replace St. George's Chapel of Remembrance at Biggin Hill, lately destroyed by fire. The former Operations Room, from which fighter squadrons taking part in the Battle of Britain were directed, is one of the suggested sites. A permanent chapel had been under consideration before the fire took place.

Many letters, sent entirely spontaneously and containing money, have been received at Biggin Hill as contributions towards the erection of a new shrine.

French Liaison Visit Returned

FOLLOWING the liaison visit of French officers from the French Air Navigation School to the R.A.F. Empire Air Navigational School at Shawbury last August, a Lancastrian of the E.A.N.S. paid a return visit on December 10, to the French School at Caseaux, 20 miles from Bordeaux.

Current methods, practices and problems of air navigation were discussed and, after visiting Caseaux the Lancastrian flew on to Gibraltar before returning to its base.

The mission was in charge of Sqn. Ldr. D. Williams, D.F.C.; Flt. Lt. J. G.

R.A.F. RECRUITING RESULTS

IN Parliament on December 5th Mr. Granville-Sharp, M.P., asked the Secretary of State for Air how many officers and men in the R.A.F. were serving on regular engagements, and how many have been so recruited during each of the last six months. Mr. Philip Noel-Baker replied that it would be contrary to public policy at present to give the figures asked for in the first part of the question; the answer to the second part is given in the following table.

REGULAR ENGAGEMENTS IN THE R.A.F.: MAY—OCTOBER 1946

	May	June	July	Aug.	Sept.	Oct.	Total
Officers: Appointments promulgated in *London Gazette*:—							
Permanent Commissions	51	63	44	23	28	27	236
Extended and Short Service Commissions	123	168	339	160	212	238	1,246
Total Officers	174	231	383	183	240	265	1,476
Other Ranks:—							
Regular engagements from civil life ...	1,223	1,233	1,437	1,849	1,859	2,536	10,137
Regular engagements from within the Service and on or after release leave	482	226	227	167	481	440	2,023
Bounty Engagements ...	—	323	782	1,258	859	1,334	4,556
Total Other Ranks ...	1,705	1,782	2,446	3,274	3,199	4,310	16,716
Total Officers and other Ranks	1,879	2,013	2,829	3,457	3,439	4,575	18,192

ADAPTED TRANSPORT: An Avro Lancastrian, of Transport Command. It will be seen, by comparison with the picture of the York on the previous page, that the faired bomber fuselage is much less roomy, though a higher cruising speed can be maintained.

SERVICE AVIATION

Jenkins, D.F.C., will be captain of the aircraft, and three of the six other crew members will be Group Capt. L. F. Brown, Wing Cdr. L. B. D. King and Sqn. Ldr. D. Morrison, who are students at the E.A.N.S.

Some French Navigation Instructors were trained at the E.A.N.S.

Iraq Levies Parade

FOR the first time since the war, the R.A.F. Iraq Levies turned out recently for ceremonial inspection by the Air Officer Commanding, Iraq, A.V-M. S. C. Strafford, C.B., C.B.E., D.F.C. The parade is reported to have been an impressive turnout, and one which did high credit to the Force Commander, Col. C. J. Luce, D.S.O.

Appointments

THE Air Ministry announces the following R.A.F. appointments:—

A.V-M. Arthur Leonard Fiddament, C.B.E., D.F.C., to be Air Officer Commanding No. 38 Group, Transport Command.

A.V-M. Ronald Ivelaw-Chapman, C.B.E., D.F.C., A.F.C., to the Air Ministry, for duty with the Defence Research Policy Committee.

A.V-M. Fiddament has been Senior Air Staff Officer at the headquarters of Transport Command since September, 1944 and was previously Air Officer Commanding No. 46 Group, Transport Command, from February, 1944. He was formerly assistant commandant of the R.A.F. Staff College for a year and before taking up this appointment he had been Director of Personal Services at the Air Ministry from April, 1942. In June, 1941 he became Senior Air Staff Officer with the British Air Staff in Washington after having served at the Air Ministry in the Directorate of Plans.

He was born at Norwich in 1896 and educated at the City of Norwich School and he was granted a permanent commission in the R.A.F. in 1919 after having served in the R.F.C.

A.V-M. Ivelaw-Chapman has been A.O.C. No. 38 Group since August, 1945. From February, 1944 until he became a prisoner of war in the following May he was a base commander and for a year previously he was Director of Policy at the Air Ministry. In 1941-42 he served in the Air Ministry Directorate of Plans and in 1940 he commanded a bomber station.

He was born in 1899 at St. Andrews, Demerara, West Indies, and educated at Cheltenham College. He was commissioned in the R.F.C. in 1917 and was granted a permanent commission in the R.A.F. in 1919.

269 Squadron Reunion

A REUNION dinner was held by 269 (General Reconnaissance) Squadron on December 7th, the Squadron's birthday. Among the seventy-seven members present were Air Vice-Marshal A. MacGregor, C.B.E., D.F.C.; Air Commodore N. S. Allinson, C.B.; Air Commodore F. L. Pearce, C.B.E., D.S.O., D.F.C.; Wing Commander Geoffrey Cooper, M.P., and three representatives of the squadron from the 1914-18 war.

No. 269 Squadron has a long history. In the 1914-18 war it was a seaplane unit and operated from the *Ben-My-Chree* in the Middle East. Last-war activities included bombing, anti-U-boat and convoy patrols and meteorological flights.

Will members who did not receive notification send their permanent addresses to Flt. Sgt. D. J. Loudon, 23, Arrowsmith Avenue, Knightswood, Glasgow, W.3, or telephone them to Sqn. Ldr. W. N. Kenyon at the Air Ministry, Extn. 1836.

R.A.F. Fund's Extension

THE establishment of a Northern Area office as part of a revised system of area control is announced by the R.A.F. Benevolent Fund to speed up assistance to ex-members of the R.A.F. in distress. The secretary will be Grp. Capt. F. Henwood, D.F.C., with headquarters in Leeds.

The S.E. Area and Welsh counties are now under direct control of the London Headquarters of the Fund at 67, Portland Place, W.1; secretary for the Midland Area, with headquarters at Leicester, is Grp. Capt. A. Ellis, C.B.E., and for the S.W. Area, at Plymouth, Flt. Lt. F. S. Isaac.

Over £1,000,000 has been spent in helping cases arising out of the late war. Calls for assistance are now at the highest rate in the Fund's history.

R.P. Training in Japan

ROCKET-ARMED fighters of the British Commonwealth Air Group in Japan are using an armament practice camp at Miho, commanded by Wing Cdr. J. G. Topham, D.S.O., D.F.C. and Bar. Every squadron in the group should have completed a course during the next few months.

As in this country, the pilots fire 60-lb R.P.s from a range of 800 to 1,000 yards at a target 10 yards square. The first to complete the course were from No. 77 Squadron. Sqn. Ldr. Wilson set the standard in his first attack, when he shattered the target. He scored four "bulls" in one demonstration. In all, 600 rockets were fired and the average error was only 19 yards. With H.E. heads, the 60-lb R.P.s have a lethal area of 300 yards.

The Officer Commanding Miho R.A.F. Station is Group Capt. D. D. Christie, A.F.C.

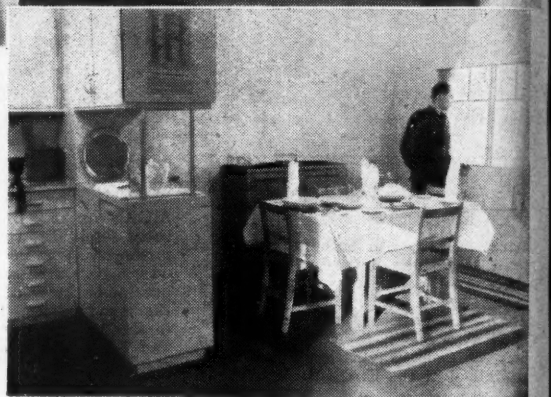
Mosquitoes for the R.N.Z.A.F.

THE United Kingdom is supplying De Havilland Mosquito Mk. VI fighter bombers for the re-equipment of squadrons of the Royal New Zealand Air Force. One unit to be re-equipped is known to be No. 75 (New Zealand) Squadron.

The first batch of ten machines—all brand-new—started on their 11,800-mile journey from Pershore, Worcestershire, to Ohakea, New Zealand, on December 10th. They were manned by aircrews of No. 1 Ferry Unit, R.A.F. Transport Command, and the officer in charge of the first batch was Sqn. Ldr. F. S. Anderson, a New Zealander.

The rest of the eighty aircraft, twenty

SERVICE AVIATION



THE NEST: An exhibition to show the post-war standard of accomodation in airmens' married quarters is in progress at the Bristol Aeroplane Company's Showrooms in Piccadilly. Above is the kitchen; top right the living room—modern and comfortable; and to the right the dining room.

of which are new and fifty reconditioned, will be ferried at monthly intervals in batches of ten. In February, fifteen New Zealand Air Force aircrews will arrive in this country to take over the ferrying from the R.A.F. Each of these crews will do two ferry trips to the Dominion.

The aircraft, which will be in radio contact with each other and with the ground, will fly singly; no attempt will be made to keep formation. The journey will be flown in daylight, and for refuelling purposes the route has been divided into twelve legs. Halts will be made at the end of each leg to allow the crews to become acclimatized to the change of temperature.

The journey will be spread over ten or twelve days, but the flying time will probably be about 60 hours. The route will be Pershore, Castel Benito (Libya), Lydda (Palestine), Shaibah (Persian Gulf), Mauripur (India), Dum Dum (Calcutta), Mingaladon (Rangoon), Changi (Singapore), Kanjeong Perak (Java), Darwin (Australia), Garbutt Schofield (Sydney), and Ohakea (80 miles from Wellington). The last leg will be the longest, for it is 1,200 miles from Schofield across the Tasman Sea to Ohakea. Each aircraft will carry its own tools and spare parts.

On December 7th the crews and their aircraft were inspected by the Rt. Hon. W. J. Jordan, High Commissioner for New Zealand, Air Marshal the Hon. Sir Ralph Cochrane, K.B.E., C.B., A.F.C. (A.O.C.-in-C., Transport Command), and Air Commodore M. W. Buckley, C.B.E. (A.O.C., Overseas Headquarters, R.N.Z.A.F.).

Joint Services Staff College

LATIMER House, Chesham, Bucks, houses the new Joint Services Staff College, to be opened in the New Year. About 100 students will take six-month courses simultaneously.

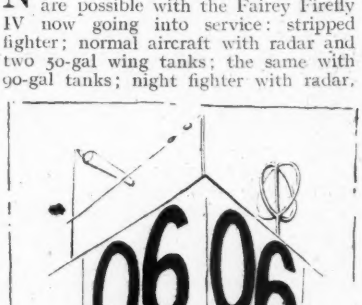
Retirements

Air Chief Marshal Sir Keith Park will shortly retire from the R.A.F. He may take a post in civil aviation.

Air Vice-Marshal Sir John Cordingley, Director-General of Manning, retires at the end of this year. His successor is A.V-M. V. E. Groom.

Firefly Variations

NO fewer than nine load conditions are possible with the Fairey Firefly IV now going into service: stripped fighter; normal aircraft with radar and two 50-gal wing tanks; the same with 90-gal tanks; night fighter with radar, flame dampers and 50-gal tank; the same with two 45-gal or 90-gal tanks; and normal aircraft with 2 × 1,000 lb bombs or 16 × 60 lb R.P.S.



"Ask him if he'll do a practice QGH with us."

R.A.F. Leaves China

ON December 5th the last R.A.F. detachment left China in the transport *Bonaventure*. The men belonged to No. 200 Staging Post.

Mine-spotting in S.E.A.

THE last of many Japanese minefields laid in South-East Asia during the early days of the war are being cleared by the 37th Flotilla of the Royal Indian Navy, which has called in the R.A.F. to check the existence of small fields around the coasts of the Andaman and Nicobar Islands.

Under the direction of Commander J. S. Roe, D.S.C., R.N.R., the work was carried out by a Short Sunderland, *Plymouth Sound* (Captain, Flt. Lt. J. E. Dewhirst), of No. 209 Squadron, Seletar, Singapore.

The Japanese egg-shaped contact mines measure about five feet by three, and after a few months in the sea become covered with yellow weed. This makes them stand out against the green coral.

It is estimated that sea-sweeping the vast area covered by one aircraft in two days would have necessitated the use of a six-ship mine-sweeping flotilla for six weeks, and a refuelling ship would have had to be sent from Singapore every fortnight.

Since the Japanese surrender over a thousand mines have been swept from around the shores of Malaya.